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The Navy's NJ-1

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MECHANIX ILLUSTRATED

MAY 1942

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BRUCE THOMAS

After 15 staid years as a West Coast writer, lecturer, and businessman, Bruce Thomas (author of the exciting account of "The Commandos—20th Century Knights" on page 40) returned last summer to salt-water sailoring, at which he'd earned his way through school and college. Determined to observe conditions in England at first-hand, he took his able-bodied seaman's license and lifeboat ticket from their frames, and shipped as an ordinary seaman again aboard a Dutch convoy ship bound from Nova Scotia to British Isles.

There he was accredited by the U. S. Embassy as a correspondent for the American magazines and newspapers he'd visited before leaving the United States, and got a 90-day stay. The British Ministry of Information gave him an office and enabled him to go on several "press tours," one of them a visit to a camp of the Commandos.

CAN TANKS FLY?

A coffin factory wouldn't seem a likely spot for one of the world's greatest aviation careers to begin, but that's where Vincent Burnelli first thought of designing planes. Since that time his giant airliners have hauled whole automobile showrooms into the sky, set amazing speed records, and startled the world. Today he plans to carry armored tanks in them! Read the story of this astounding designer in "Burnelli Did It First"—in the June MECHANIX ILLUSTRATED, out May 1.

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You may worry about the tread on your tires

but here is one worry you can avoid

MAYBE you can't buy new tires, but you can make your old ones last longer by giving them extra care.

And you can make your *car* last longer, too, if you take *extra* care to avoid *extra* wear on your car's king pins, tie rods, steering crank bearings and other vital friction points that means costly repair bills when neglected! Play safe—with Marfak bumper-to-bumper *chassis lubrication* every 1,000 miles!

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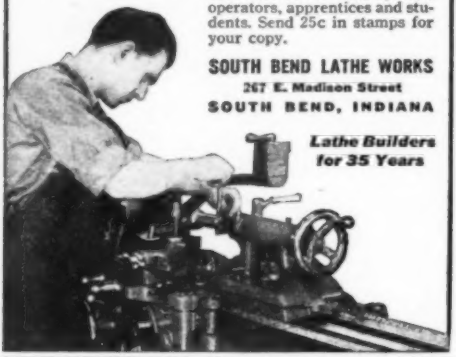

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Strange Keys to the Powers of the Universe

"GOD GEOMETRIZES," said an ancient sage. Within the straight line, curve, and angle—and their combinations—exist the forces of creation. These *secret symbols* contain the mysterious laws of the universe. Upon their right use—or the neglect of them—the success or failure of every *human enterprise* depends.

Have you a desire, *something you wish to accomplish* in life? Put your finger on a dot. In whatever direction you move your finger from the dot, you have made a beginning. Thus a dot is the symbol of *one*—or a beginning. Your desire then is also symbolized by *one*. If you follow the *proper method* or way to accomplish what you want, you have arrived at point *two*. Whenever these two symbols are brought together—the idea and the right way—you produce point *three*—the success of your plan. Success, therefore, is symbolized by the three equal sides of a *triangle*.

In planning your personal affairs—business, domestic, or the welfare of your family—do you use a *Cosmic formula?* Do you determine whether your acts are in accord with Divine truths eternally expressed in symbols? Why does the circle represent completion? Why is it said that a man is on the square? These symbols are used by astronomers and scientists to prove the physical laws of the universe—why don't you apply them to the problems of your everyday world? Learn what symbols, as powers and forces of nature, you can simply and intelligently use in directing the course of your life.

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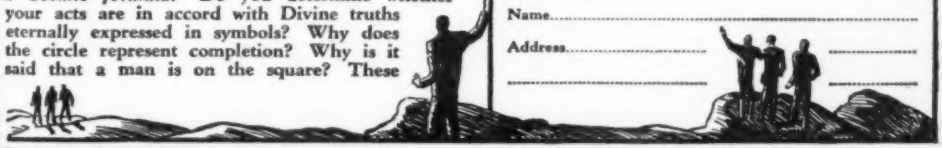


THE ROSICRUCIANS, AMORC - SAN JOSE, CALIFORNIA, U. S. A.

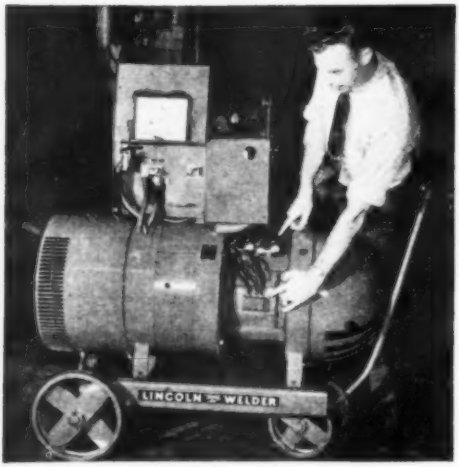
NEW PRODUCTS AND INVENTIONS

LATEST HOME AND SHOP DEVICES • POPULAR PATENT IDEAS

GOSSIP OF DEFENSE AND INVENTORS

by Morton Leese

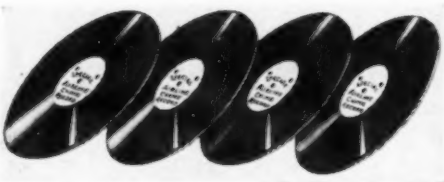
Our inventors are to assist not only in the present national emergency, but in post-war planning as well. A new Patent Planning Commission has been created by President Roosevelt to create a reservoir of new products and improvements on existing ones, to which industry can apply its force when arms, ammunition and other military supplies cease to be our primary productive aim. The Commission is expected to work in close co-operation with the Patent Office.



Complete protection against heat or excessive current, or both, is provided by this new protective control device for arc welding machines. It is said that the device will protect against burn-out, permitting long maximum operation safely.

The Patent Office cannot respond to inquiries as to the novelty of an invention before an application for a patent has been filed. Nor will the Office give any information as to whether a particular improvement has been patented.

The Office is open to any inventor, and the records relating to all patents granted may be inspected either by the inventor or by any attorney or agent he may wish to employ.



These new chime records are especially recorded for reproduction from church belfries. Some trouble had been encountered by recorded chime notes clashing with those struck previously. These records have no tone clashes, manufacturer says.

Without a single exception, each 10-year period in the history of the Patent Office has shown an increase in the number of issued patents over the preceding 10-year period. The last period, that between 1930 to 1940, showed an increase of more than 40,000 issued patents over the preceding 1920 to 1930 period.

* * *

Are you interested in becoming a Patent Examiner? Technically trained men may inquire at the Civil Service Commission, Washington, D. C., for the necessary requirements and the time and place for examinations for Examiners.

* * *

An inventor may prosecute his own patent application. However, the Patent Office advises that unless an inventor is familiar with such matters a competent registered patent attorney

[*Continued on page* 31]

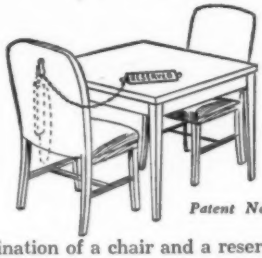
Driven by compressed air, this newly introduced portable batch mixer is rated at 1½ horsepower at 400 r.p.m. It is said to be ideal for mixing such things as liquids containing fruit, etc., that would not be distorted by the propeller blades. It can be operated without danger of fire.

Popular Patents

By substituting for the conventional rear end portion of a flashlight a newly patented rubber unit, the flashlight may be conveniently held in the mouth. This permits the hands of the user to be free. The new attachment has an inner metal lining which screws on in place of the usual end piece. A T-shaped bit, also made of rubber, is adapted to be inserted in the mouth and securely gripped between the teeth. A chin brace is also included to relieve the jaw of strain and to assist in supporting the flashlight.

Patent No. 2,244,288

* * *

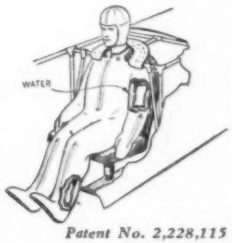


Patent No. 2,231,315

A combination of a chair and a reserving block for reserving tables in restaurants and similar places won a recent patent. The reserving block is attached to the chair by means of a flexible connection.

* * *

Dive bombing has not been overlooked by inventors. A recent patent provides for a garment to be worn by dive bombing pilots. The garment has two layers between which a liquid, such as water, can flow freely from part to part. The fluid rushes in the same direction as the blood of the pilot when a dive or a steep climb is made. The rush of flow of the liquid offsets the tendency of the increase in blood pressure in the pilot's body. The inventor claims that dizziness and unconsciousness is avoided by the counter-pressure of the water in the garment.



Patent No. 2,228,115

* * *

Patent No. 2,243,483

Light work of electric shaving is the object of a patented light attachment for electric razors. The unit includes a small light bulb and is adapted to replace the conventional side of an electric razor.

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Chips from the EDITOR'S WORKBENCH

Lyn L. Wood, farmer of Mendon, Utah, is shown below with one of his four models of Case Agitator threshers. The photo at the left shows one of Mr. Wood's large scale models. The bottom photo shows the model thresher attached to a model tractor.

Spring Comes to MI

WHEN you open this issue of MI to the section printed in rotogravure (starting on page 35) you will find that its pages, like the budding trees, have taken on new beauty. On these pages you will find a brand new type of ink with a lustrous, rich tone that gives new life and sparkle to text and illustrations.

The engraving ink that works this refreshing impovement is the result of weeks of blending and testing with numerous ink formulas. You won't find it in any other magazine.

A $5.00 Workbench First award and a Certificate of Merit go to Mr. Wood, above, for his model thresher, which contains 2,100 parts. It's 12" high.

We are constantly trying to improve MI. We've been adding pages, enlarging the How-To-Build, the Feature and the News sections, adding new writers and designers. We've been gratified to see thousands and thousands of new readers buying MI every month. We hope you'll like our latest attempt to make MI a better, more attractive dime's worth for you Workbenchers.

War on Two Wheels

BICYCLES are definitely on the way back, and if you are one of the millions of Americans who are going to take up cycling this spring you'll want to read the article, "Back to the Bike," on page 101. Many who are using their automobiles for nothing but essential travel are taking up cycling. Americans like to get around, and if they can't do it one way they'll do it another.

Incidentally, an eminent medical authority recently suggested that bicycle riding be officially adopted by the Army as part of its training routine. He said bicycle riding is the best conditioner the Army could prescribe. What's good for a soldier is good for a civilian, too, and in wartime we all need to be physically fit. So join the bicycle brigade and watch your waistline go bye-bye.

Editor's Workbench Chips

Contest

AGAIN, MI's "Word-Within-Words" contest appears to have made a smash hit with our readers. As this is written, we are being swamped with entries. We can't, at this time, tell you exactly when we will make the announcement of winners, but we can promise you it will be in the earliest possible issue. Because of the thousands and thousands of entries, too, we must repeat the statement made in the rules that we *cannot under any circumstances* enter into any correspondence with entrants about the contest. This is a hard and fast rule which we cannot break. So watch forthcoming issues of MI to learn whether you have won any of those swell prizes!

Day of the Handyman

WITH severe restrictions placed on the sale and use of automobiles, the poor garageman is faced with a sad outlook. If he hasn't been lucky enough to be drafted, he finds himself in his shop faced with the prospect of less repair work due to the greatly reduced amount of automobile use in the nation—and with little or no new car business to make the cash register ring.

Our neighborhood garageman, however, had an idea that we think worth passing along. He reasoned that with wartime restrictions in force the people in his district weren't going to be able to buy very many new household gadgets of any kind; that they were going to have to make the old gadgets do. There won't be many new lawnmowers, gate hinges, door latches, or a thousand other things used in every household. So now the garageman has set himself up as an all-around repair man.

He advertises, "Fix it up! Everything you repair saves American factories from making something new! When you save factory time, you're taking

[*Continued on page* 14]

"I am enclosing a snapshot of boat *Snuffy* from HOW TO BUILD 20 BOATS No. 6. She is my first boat, built in spare time . . ." That's how Harry Federtristi of 82 Rose Terrace, Newark, N. J., begins his letter. He goes on to say, "I like her and so has everyone that has seen her perform. She does about 10 miles per with 3 h.p."

Harry evidently did a good job building his boat, and he apparently stuck to the plans. If you do that with a boat from HOW TO BUILD 20 BOATS, you'll always get the result he got—a satisfactory boat. A $3.00 Workbench award and a Certificate of Merit go to Mr. Federtristi for this picture of his handiwork.

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Editor's Workbench Chips

[*Continued from page 13*]

a shot at the Japs! Whatever it is, let me repair it!"

Now he's doing a booming business.

It occurred to us that our garageman's idea is a thought that applies particularly well to every man with a workbench in his home. Now is the best time in history to use that workbench! Every time you produce something for yourself instead of buying it readymade, you are saving American factory effort which can, in turn, be applied to war work. So be patriotic! Use your workbench!

Blackout vs. "Dimout"

WE KNOW we are stirring up a hornet's nest by presenting the article, "No Blackout For America," on page 54. However, this is an argument that we'd like to see stirred up violently.

Written by a distinguished Westinghouse lighting engineer who has devoted a great deal of study to the subject, this article comes out strongly against the complete blacking out of American cities as air-raid protection. The author, Mr. S. G. Hibben, Director of Applied Lighting for Westinghouse, contends that until such time as *severe*

Scooter From MI Plans

Walter P. Tefft, of Saunderstown, R. I., built this motor scooter from the plans of "Midgie" which ran in the January, 1941, issue of MECHANIX ILLUSTRATED. Walt tells us that the job cost him about $20, including wheels, motor, and tires. The motor is a Briggs and Stratton model W.M., and gives the scooter a top speed of about 25 miles an hour.

The only feature that seems to have been omitted from Walt's version of "Midgie" is the knee action front wheel. The big, springy seat that he has on it probably makes it easy riding anyway. A $3.00 Workbench award and a Certificate of Merit go to Mr. Tefft for this snapshot of his scooter.

Editor's Workbench Chips

bombing attacks are regularly launched against America, more damage will be caused by a complete blackout than by bombs.

Major R. P. Breckenridge, camouflage expert of the War Department, is as strongly opposed to Mr. Hibben's "dimout" as Mr. Hibben is to the blackout.

"Don't listen to talk of dimouts," Major Breckenridge said recently. "A dimout won't work. Street lights, if on at all, will guide the enemy to his objective."

Major Breckenridge gives no further arguments. Mr. Hibben believes his arguments are sound. We leave judgment to the public.

Ahoy!

THE boating season is practically at hand again, and many MI readers will be fitting out their craft on these warm spring week ends; or finishing up the new boats they're building to get them overboard early. Owners of craft 16 ft. or over in length must pay a use tax this year, according to the length. From 16 ft. to 28 ft. it's $5, and proportionately more for larger boats. Skippers of big yachts will have to shell out tidy sums, but fortunately the great majority of amateur salts fall into the first category. If you haven't taken care of this little matter, write to your local Collector of Internal Revenue (same place you file Income Tax) for a tax application blank. There's also one other little matter that will require attention before you can go for the

[*Continued on page* 16]

Jack A. Nelson, automotive engineer of 921 Oak Park Avenue, Des Moines, Iowa, built this small farm tractor. It's made chiefly from old automobile parts, and is 5 feet long. The tread of the wheels is 36 inches. The front wheel is a wheelbarrow wheel.

A one-horsepower Briggs and Stratton motor drives the little tractor with enough power to pull all the coaster wagons in the neighborhood, according to its builder. The radiator shell is a brand new one, and adds a factory built appearance to the job. Two Ford transmissions give the machine ten speeds forward and three speeds in reverse. A Model T rear axle with 10 inches cut from each side forms the rear axle. A $3.00 Workbench award and a Certificate of Merit go to Mr. Nelson for this snapshot of his excellent little tractor.

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Editor's Workbench Chips

[*Continued from page* 15]

first sail. The Government requires that all pleasure boat operators *and passengers* (if they are frequently aboard) have identification card-permits which they must carry on the boat at all times. There is no charge for the cards and they are obtainable at any U. S. Coast Guard Station. Make inquiries in your neighborhood as to location of Coast Guard headquarters and be sure to get permits for yourself, family and friends you expect to have out on your boat a lot.

While we're on the subject, there's a brand new edition of the famous HOW TO BUILD 20 BOATS (No. 7) now on the newsstands. It sells for only 50c and if you're a real boat bug you won't want to miss it. Packed with plans for everything from a 7 ft. dinghy to a 33 ft. schooner, plus many useful and informative articles on various phases of boating, you'll find it the most fascinating book on your favorite subject that you've ever seen.

Protest

WE can take most of the war restrictions with a grin, but there is one restriction about to be imposed to which we take violent exception. That is the attempt to cut in on the "ham" radio field with restrictions on materials.

We think any attempt on the part of the Government to cut down on the "hams" is extremely short-sighted and can only defeat its own purpose.

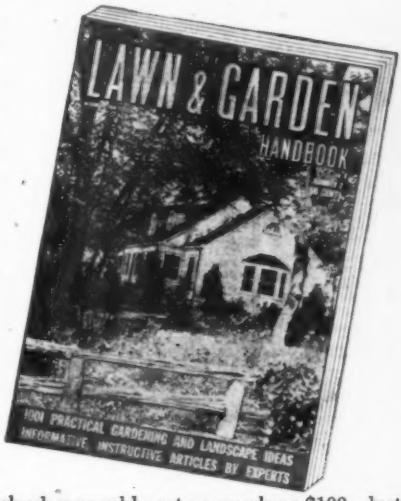
This is a radio war. In the field, practically all communication is by radio. Wars are run by radio today. On the face of it, then, it would seem reasonable for the Government to grab all the

[*Continued on page* 18]

"My dad has been a reader of MECHANIX ILLUSTRATED and Modern Mechanix (MI's old name) for years, and has built many things from the plans published in the magazine. Enclosed is a photo of the sidewalk automobile we built from plans purchased from you. My father and I built it in our workshop, and it certainly was instructive and a lot of fun making the parts and assembling them. It runs fine and has plenty of speed. It will do 30 miles per hour. We used a 1 horsepower 4-cycle motor. I have been the envy of all the kids in the neighborhood, and have a lot of fun with it." So writes Leon K. Grisbaum, of 306 Owen Ave., Lansdowne, Pa. Leon and his dad did a nice job on the little car, the snapshot of which brings Leon a $3.00 Workbench award and a Certificate of Merit.

WAR GARDENS ARE PRACTICAL AND ECONOMICAL

ENLIST in the Victory Garden program this Spring! You can aid the nation's war effort and also economize on your own household expenses by getting the down-to-earth facts on war gardens in the new edition of LAWN & GARDEN HANDBOOK, just out. This handy and instructive book features a complete summary on Victory Gardens by H. W. Hochbaum of the United States Department of Agriculture.



In addition, LAWN & GARDEN HANDBOOK contains many other articles of great value and interest to the amateur gardener. The 146 pages of this handsome book are packed with information and pictures on such useful subjects as: how to obtain a good lawn, planting seed flats, the children's own garden, chrysanthemums for Fall beauty, designs for brick and stone walks, flower arrangement, and dozens of related topics.

LAWN & GARDEN HANDBOOK will save you money in making a landscape plan for your home. This book offers four basic garden plans drawn especially by an expert for this publication. Ordinarily one such plan would cost as much as $100—but you get *four* of them in this 50 cent book! Get your copy today at your newsstand, or order by mail with the coupon below.

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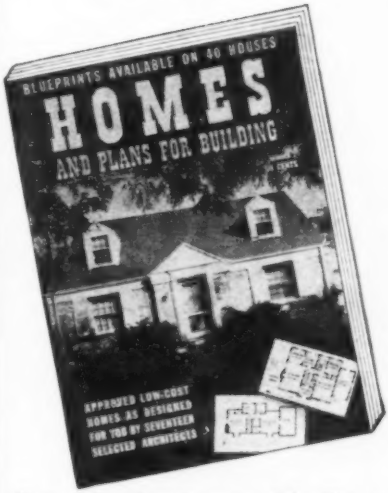
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Editor's Workbench Chips

[*Continued from page* 16]

radio materials in existence for the war effort.

However, we don't believe that to be true—and here's the reason: It takes highly trained men to run radios. This war probably is going to last for a number of years. The Government is going to have to have thousands and thousands of additional men trained in this field three years from now, or five years from now—or maybe ten years from now. And the greatest source—almost the only source, indeed—for such men is to be found in the great group of "hams," most of whom take correspondence radio courses and then translate this theory into practical radio knowledge by building and operating their own transmitters and receivers.

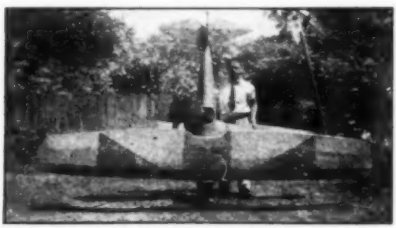
How are the young men now interested in radio to train themselves if they are deprived of materials? How can they gain practical knowledge if they cannot build their own sets? Where is the new crop of radio-trained experts for the Army and Navy and Air Force coming from, if today's young "hams" cannot train themselves?

We urgently ask the Office of Price Administration and other governmental bureaus to consider this aspect of materials rationing before shutting down on the "hams."

Wings for Youth

HAVE you thought of what is to become of our air-minded youth now that production of private planes is being drastically reduced for war production? How are our 'teen-age boys and girls going to grow up air-minded and acquire the feel of flight?

The best answer we have seen to this question is contained in the latest book on the subject of gliding and soaring, "Youth Must Fly," by E. F. McDonald, Jr., president of the Zenith Radio Corp. (Harper & Brothers, $2.50.) Captain Eddie Rickenbacker, commenting on this book, said, "It is my hope that this book will become compulsory reading for the law-makers and defense builders,



George Carey, of 97 Joseph St., Chatham, Ont., is the builder of this giant model plane. The top wing has a span of 11 feet 10 inches. If it was much bigger George could probably ride in it himself. It has a class B motor in it. A $3.00 Workbench award and a Certificate of Merit go to Mr. Carey for this snapshot of his plane.

Editor's Workbench Chips

as well as for every student-aged citizen in this country."

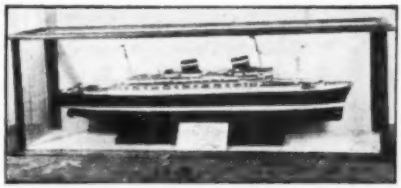
For the book's thesis that gliding is to become the invaluable and comparatively inexpensive means of preliminary training for budding pilots, we heartily endorse Captain Rickenbacker's comment.

Fighting Names

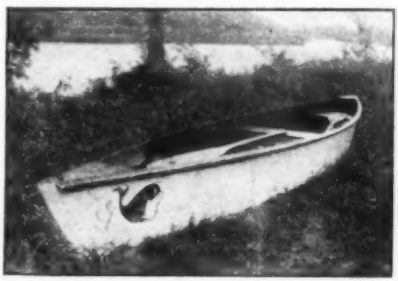
ALMOST as confusing as the alphabetical Government agencies are the official numbered names of America's fighting airplanes. The British have recognized this fact and have given "battle names" to American warplanes delivered for British service. Our P-40, for instance, is known to the British as the "Tomahawk" and the "Kittyhawk," the latter being the advanced P-40E version of this famous pursuit. About the only plane which has won a "battle name" in American Army service is our B-17, the Flying Fortress.

The Navy, however, has at last taken official steps to remedy this situation and has given

[*Continued on page* 20]



This beautiful model of the "America" was built by L. L. Olson, of 110 8th St., Cloquet, Minn. He built it from plans in MECHANIX ILLUSTRATED, and he certainly did a good job on it. He seems to be quite a boat fancier, too, for he tells us that he's now working on a model PT torpedo boat from MI plans also. In addition, he also made a beautiful cannon model. Nice work, Mr. Olson. This snapshot brings him a $3.00 Workbench award and a Certificate of Merit.



This "Modern Pirogue" was built from plans in HOW TO BUILD 20 BOATS, by Fred Berry and Don Cole, of 1357 East 20th St., Tulsa, Oklahoma. It's given them very satisfactory service, they tell us, and they're planning to build another boat from the same book. Good work. This picture brings Fred and Don a $3.00 Workbench award and a Certificate of Merit.

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Editor's Workbench Chips

[*Continued from page* 19]

"battle names" to all of its various planes. Here is a list of such names recently released by the Navy Department:

FIGHTERS

Brewster F2A	Buffalo
Grumman F4F	Wildcat
Vought F4U	Corsair

SCOUT BOMBERS

Brewster SB2A	Buccaneer
Curtiss SB2C	Helldiver
Douglas SBD	Dauntless
Vought SB2U	Vindicator

OBSERVATION SCOUTS

Curtiss SO3C	Seagull
Navy OS2N, Vought OS2U	Kingfisher

PATROL BOMBERS

Boeing PBB	Sea Ranger
Martin PBM	Mariner
Consolidated PBY	Catalina
Consolidated PB2Y	Coronado

TORPEDO BOMBERS

Douglas TBD	Devastator
Grumman TBF	Avenger

A. J. Sorlie, of 927 Jordan Ave., St. Paul, Minn., is the proud owner and builder of this trim little runabout. "Being an amateur woodworker, after a fashion," writes Mr. Sorlie, "I invested 50c in a copy of HOW TO BUILD 20 BOATS No. 6 plus $20.00 in materials, and came out with this 120 pound plywood number."

Mr. Sorlie goes on to say that his boat is ideal for fishing when powered with a fractional horsepower motor, and can also give a snappy performance with a 6½ horsepower motor—when a marine thrill is the order of the day. The motor shown on the boat is the 6½ horsepower job. A $3.00 Workbench award and a Certificate of Merit go to Mr. Sorlie for this snapshot of his boat.

Editor's Workbench Chips

Boom!

A NEW explosive (which must remain anonymous) has been developed that is so sensitive and powerful that extraordinary measures of precaution must be taken when shipping it. The stuff is used in loading detonators in high-powered demolition shells and bombs. Recently a shipment of ten pounds of the explosive was sent by rail from the factory to the loading plant. Ten freight cars were required to carry the ten pounds, which was split up into units of 2 ounces each, encased in 50 lb. blocks of solid lead.

Naturalist

APROPOS of nothing in particular, we wonder how many MI readers have noted mentally, while listening to the President speak, that his fondness for animals almost invariably creeps into his fireside chats to the Nation. On the basis of the various types of wild life that he has used to illustrate points in his speeches, Mr. Roosevelt can rightfully lay claim to being something of a naturalist. Here are a few of the birds, animals

[*Continued on page 22*]

Norman Davis, Jr., of Bonners Ferry, Idaho, built this sturdy looking motor scooter without ever having seen one—and he had to work hard to build it. "Four years ago," writes Norman, "We were 'blown out' of the Dust Bowl, and came to this cutover timber land in the pan handle of Idaho. I had to leave my pony." That's only the beginning of his story, but it explains why young Mr. Davis, who was only ten years old at the time, couldn't get accustomed to walking.

He cut cord wood to buy the Briggs and Stratton washing machine motor, and finally got all the materials together. He was only fourteen years old when he completed the motor scooter, but it's still doing a good job of taking him where he wants to go. It certainly looks as though his hard work was well rewarded, as that scooter is a very workmanlike job. A $3.00 Workbench award and a Certificate of Merit go to hard working Mr. Davis for this snapshot.

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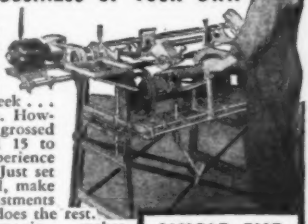

There's big money in sharpening lawnmowers with the Ideal Sharpener. Most men earn up to $25 a week . . . even in spare time. Howard Heller, Minn., grossed $1,100 from April 15 to Sept. 15. No experience needed. It's easy. Just set mower in the Ideal, make a few simple adjustments . . . the machine does the rest. Ideal sharpens like magic . . . makes old, dull, worn blades cut like new. You get $1.00 to $1.50 for every job. Our FREE Plans show you how to get plenty of orders. Start in basement or garage. Work spare or full time. Easily, quickly, you build up a money-making business of your own. Today, when people have money, is a good time to *start*.

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Editor's Workbench Chips

[*Continued from page 21*]

and reptiles with whose characteristics he has shown himself well acquainted: Eagle, ostrich, vulture, lion, tiger, mole, fox, wolf, horse, donkey, copperhead, rattlesnake, turtle.

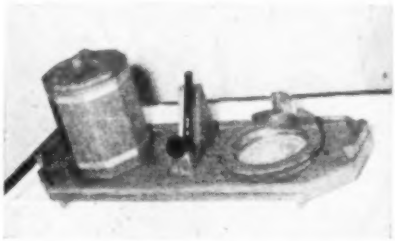
Gold Mine

FEW stories we have published in recent months have attracted such wide interest as our yarn in the February issue entitled, "Found—The Key to the World's Richest Gold Mine." Among other things, dozens of ambitious persons have written us indicating that they intend to outfit expeditions themselves and set out in search of the fabulous "Lost Dutchman" mine.

Many of these adventurers have asked for additional information on the subject. To these, we recommend a book published by Barry Storm, noted adventurer and writer on such subjects, entitled, "Gold of the Superstitions." The book was published by Southwestern Publications, Box 92, Aguila, Arizona, and contains a world of additional intriguing clues to the lost mine.

We have an apology to make, too, in connection with our original story. Our authors, Lester David and Irwin Lewis, mentioned Charley Williams, well known Arizona prospector, in their article and in so doing got several of the facts concerning Mr. Williams confused. The authors say that they confused Mr. Williams with another prospector.

To set the record straight, Mr. Williams went prospecting for the Lost Dutchman in 1937 and 1938, and not in 1940, as our authors stated; he is not an "old prospector," actually being only about 50 years of age; he never said he found the mine in



"MECHANIX ILLUSTRATED has been a welcome visitor to my house for a long time and I have built many items from its directions. My hobby is home carpentry and our home is furnished with much of my handiwork. This, however, is my first attempt to cop that covetous Workbench award and Certificate of Merit which you issue for work well done." So writes Mr. F. J. Stacy, of Alpena, Michigan. Mr. Stacy built this humidor set from plans in the February, 1942, issue of MI, and he certainly did a good job of it. The set, which is made from worm eaten chestnut wood salvaged from old packing cases (as instructed in the article) looks just like the original. A $3.00 Workbench Award and a Certificate of Merit go to Mr. Stacy for this snapshot of his excellent piece of woodwork.

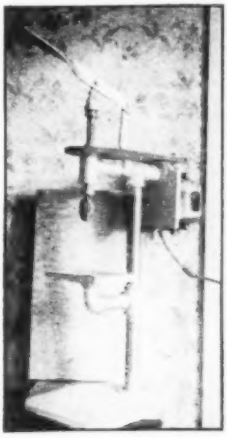
Editor's Workbench Chips

a canyon, but actually did find some old Spanish melted gold nuggets in a cave; and, also, he was not shot and wounded, as the article stated, but did become weak and sick from hunger and exposure.

The authors and MECHANIX ILLUSTRATED sincerely regret these mistakes and hope that they have in no way cast any reflection on Mr. Williams. Mr. Williams is a man of very good reputation in the Southwest. The correct story about him is much more exciting and interesting than the garbled facts which the authors managed to get together on this particular phase of the story.

So, to Mr. Williams, our apologies, and to the adventurous prospectors, the best of luck!

—The Editors



Lloyd Leonard, of 710 Main Street, Somerset, Mass., built this drill press from pipe fittings from plans in MECHANIX ILLUSTRATED. Although he's been reading MI for years, this is his first project—in fact, he tells us that he doesn't even own a workbench. The job he did on that drill press certainly doesn't look like a beginner's, but it is. At the present time, with machine tools in such demand for defense production work, workshop fans can always find a way to equip the home workshop with machines built from scrap material. This drill press, accurately made, can compare with high-grade factory jobs, in operation and appearance. Aluminum paint dresses up this one. This snapshot brings Lloyd a $3.00 Workbench award and a Certificate of Merit.

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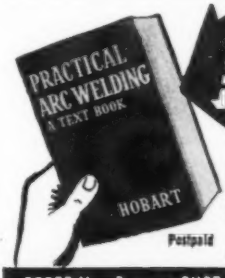

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Letters To The Editor

To the Editor:

The picture on page 43 of the January, 1942, issue of MI shows a man in the U. S. Army, with the insignia on the shoulder loops that of a captain. However, the caption calls him Major.

This is evidently a mistake for, knowing something of the army, I know that a major wears a gold oak leaf as an insignia on the shoulder loops while the captain wears the two silver bars as shown in your picture.

E. J. Nasticky
Chicago

This variation of facts was caused by the promotion of Captain Scott to the rank of Major after our story was written and the photograph taken.

* * *

To the Editor:

I read with some interest the article on "The Battleship Is Sunk" in your March issue. Mr. Whitehouse's opinions have me worked up a bit and for "morale" reasons I would like to see the other side of the picture in print.

As all airmen usually do, Mr. Whitehouse has overlooked several modern innovations in naval tactics, ships and guns and has gone "overboard" in his overestimation of the hitting power of the modern plane. These include the following: Redesigned AA type cruisers, modern 20 mm high-speed cannon, 5" AA guns firing 33 rounds per minute, new high-speed directors with automatic computers to take care of dive attacks electrically and hydraulically coupled to gun batteries, new "cone" type 5" barrages, and too many other things to mention here.

He has overlooked the fact that if Hitler had a navy, this war would have been over in three months. He has overlooked the fact that it took sixty ships to convoy one single division to the Far East. He has made ridiculous statements as to costs of ships and destroying power of planes. He talks of passing fads, strategy and devices in warfare. Well, we still have cavalry. Instead of a suit of armor, our modern knight has tons of plate armor about him, and instead of a charging steed, he has a roaring engine and steel and rubber caterpillar treads. The Nazi panzer columns in France were the ideal, the very essence of the demoralizing cavalry charge. We can carry this line of reasoning out with other "outmoded" tactics and devices.

I won't go into any more arguments since enough have been presented here to give you a rough idea of what I am driving at. I'm no authority but I certainly disagree with Mr. Whitehouse and feel I have reason to. And I think I'm ready and able to furnish more facts.

Ted Powell
Maspeth, Long Island

* * *

To the Editor:

After reading "Found—The Key to the World's Richest Gold Mine," I am seriously thinking of taking a crack at locating it on my next vacation.

However, I would like a little further information as to what is required to outfit such an expedition. I have nothing to lose except my life and whatever money I put into such a venture, and would like to contact someone with some knowledge or experience along these lines.

Arthur Ebert
Long Island, New York

* * *

To the Editor:

I am deeply interested in an article appearing in the February issue of your magazine. It is the story of the Lost Dutchman Mine. I heard about the mine several years ago from an old man who had wandered about in many sections of the United States. He spoke of it rather vaguely, but said that such a mine really existed and would be found sometime.

I would like to obtain all the information possible about the mine. I wonder if the message supposedly written by the old Dutchman is really authentic or a practical joke. I wonder if anyone really knows.

Henry Fischer, Jr.
Detroit, Michigan.

See page 22 for more gold mine information.

Letters To The Editor

To the Editor:

I noticed an article in your December issue about observing the inside of the eye and also other odd facts about sight. I happened upon a new trick (perhaps more than a trick) that I believe reveals some of the nature of the retina in a much better way. The method is so simple that I am inclined to believe that science has this unusual trick on record somewhere.

This discovery involves a drop of water, a tiny tube, a rather strong source of light, and the eye of the observer. A small drop of water is placed at one end of a metal cylinder about an inch long and 1/16 inch in diameter, so that it forms a miniature lens. A shield of cardboard should be placed around the tube so that observation is through the tube. The tube should be held very close to the eye with the drop of water almost touching it; then sight is directed toward a light with no other light shining on the eye.

This gives an enlarged view of the nerve in the retina and perhaps veins either in the lens or the retina.

Other peculiarities can be observed by using various transparent liquids. Too, a simpler but less clear image can be seen by using a piece of tinfoil with a pinhole piercing the center and a drop of water in the hole.

Paul Auker
Akron, Ohio

* * *

To the Editor:

As one of the many readers of your magazine, I would like to know if any of my fellow readers has an idea for a rabbit trap. I have set up many snares, with no results, and would appreciate it very much if anyone could offer some suggestions.

Arne Unneberg, Jr.
Williston Park, New York

* * *

To the Editor:

I purchase your most excellent magazine from local news dealers and enjoy it very much. For a long while I have worked on hobbies in my little shop.

Do you think that one of your readers could tell me just how to clean the lead from a barrel of a Winchester without injuring it? Any ideas would come in handy.

Thomas P. Turner
Tallahassee, Florida

* * *

To the Editor:

I believe I am safe in saying that a good many of your readers live on farms. The reason for my letter, therefore, is to suggest that you give some hints and tips for farmers, and perhaps once in a while show plans of, for instance, a rabbit pen, a pigeon shanty, a chicken coop, etc.

Please don't think I'm dissatisfied with your magazine as I'm not. These are only a few suggestions of my own liking.

James Macula
Leechburg, Pennsylvania

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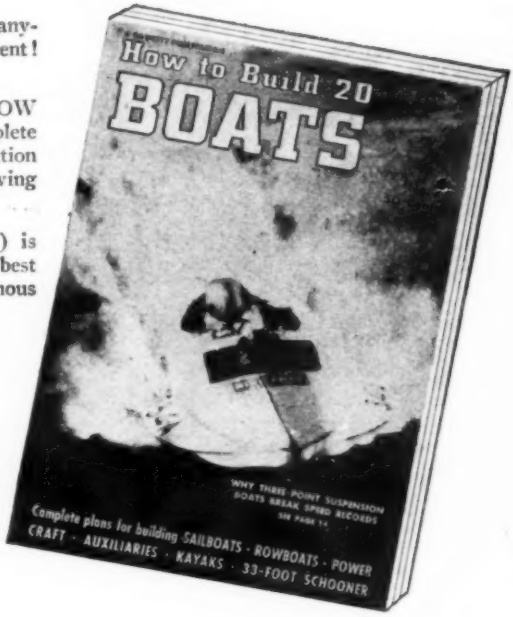
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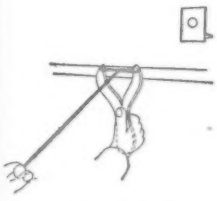
New Products And Inventions

[*Continued from page* 10]

or agent should be employed, since the value of patents depends largely upon the skillful preparation of the specification and claims. The Office will not aid in the selection of an attorney or agent, although a register of attorneys and agents is on file in the Patent Office.

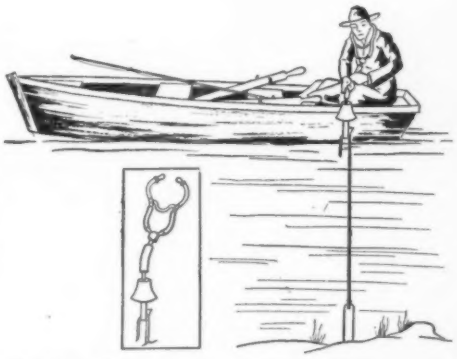
* * *



The familiar slingshot takes a new form in a patented novelty which permits a projectile to be shot and then recovered. The device includes the usual handle and side prongs. Between the ends of the prongs an elastic band is fastened, and one end of another elastic band is attached to the middle of the first band. To the other end of the second band a ball projectile is fastened. The ball can be shot at any desired target on a table, for example. (No. 2,264,787.)

* * *

Because of the habits of fish, it is known that certain species may be found in different locations of lakes, rivers, or the like. Certain fish like weed beds. Other fish seek flat, muddy bottoms. Still other fish are found in sand and gravel while many varieties seek a rocky or stony bottom. Fishermen interested in the type of bottom where they are fishing can be provided with a patented acoustic detector. The device includes a hollow metal tube which is attached by an adjustable cord to a stethescope type hearing unit. The



tube is made to vibrate against the bottom, and the vibrations are carried through the connecting

(Continued on next page)

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New Products And Inventions

[*Continued from page* 31]

line to the listening unit. The nature of the vibrations enables a fisherman to determine the character of the bottom. The general contour of the bottom can also be known. (No. 2,261,375.)

A novel table equipped with food warming compartments and table and food illuminating lights was recently awarded a patent. The combination includes a usual type of serving table and a warming table rotatably mounted over the serving table. Several partitions divide the warming table into suitable individual spaces for separate foods. An electric resistance heating wire placed over the warming table maintains a desirable degree of heat in the food. Lights in the base of the warming unit illuminate the dining table; while other lights are so located as to illuminate the food being warmed. When it is desired to serve any particular food, the warming table is rotated to a position which places the desired article of food in a position to be conveniently removed to the dining table. Suitable wiring in the base of the table furnishes electricity for the lights and the warming unit. (No. 2,261,514.)

* * *

During World War I Edison turned out 35 devices for the Navy; Elmer Sperry developed a searchlight useful in airplane defense and also a bomb sight; Maxim designed improvements in torpedoes, mines, and ships; and David Brunton worked out improvements in machine-gun controls and sniper locaters. World War II will bring forth still other inventors to serve our country. INVENT TO KEEP 'EM FLYING.

[*Continued on page* 148]

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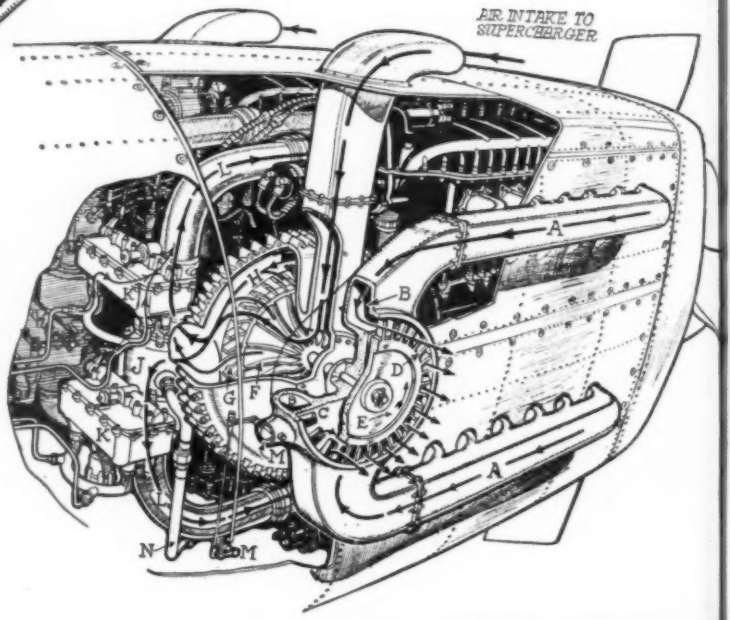
WARPLANE SECRETS

THE MESSERSCHMITT ME-110. Two Mercedes-Benz engines power this 3-place fighter. Its design followed that of the single engined, single place ME-109. It carries four machine guns in the nose and two cannon. A pair of flexibly mounted machine guns are carried at the rear of the cabin. Probably to facilitate assembly by inexperienced workers, many of the parts on this ship are designed to be interchangeable by virtue of various compensating features rather than accuracy of fit.

The exhaust-driven supercharger now in common use on Allied planes, is actually a turbine. As shown in the diagram at the right, the exhaust gases strike the inclined, propeller-like vanes of the turbine unit, turning it at high speed. The paddle-vaned supercharger on the inner end of the shaft turns at the same speed and draws in air through the intake ducts. This air is forced under pressure through the intake manifold to the cylinders, fuel being introduced en route. Exhaust energy, otherwise wasted, is thus utilized to increase efficiency.



Build Models For The U. S.

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Here's how model builders can do their part in our National Defense Program.

ALL of you model builders! Here's your chance to help Uncle Sam!

Recently, Secretary of the Navy Frank Knox issued an appeal to model builders in 26,000 high school manual training schools in America to build 500,000 true-scale models of warplanes for use in training Navy personnel.

But *all* model makers are urged to join this program—for it is much larger in scope than Secretary Knox' appeal indicates! Not only high school students, but *everyone* who can build models will have an opportunity of helping Uncle Sam in this project.

For not only the Navy, but also the Army, the Merchant Marine and, particularly, the Office of Civilian Defense can use these new type true-scale models.

So that *all* model makers who wish to help may participate, MECHANIX ILLUSTRATED is publishing plans for two such models in this issue.

Although simple to make, these models have one very special feature which distinguishes them from other models: Whereas most solid models are made about the same size regardless of the size of the original plane, these models will be *true-scale*, on a scale of one inch of model size to six feet of plane size.

Thus, one of these true-scale models, when viewed at a distance of, say, 35 feet, will have the exact appearance of the actual airplane flying at about 2,500 feet!

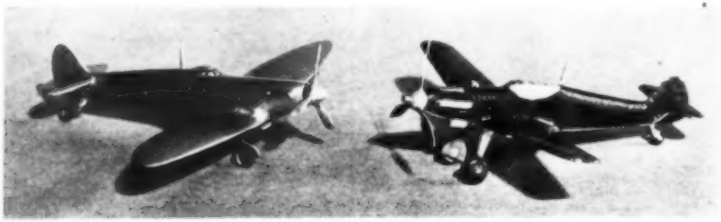
The Navy, according to Secretary Knox' announcement, plans to use these models to train sailors in aerial gunnery and also in airplane recognition. It is expected that the Army and the Merchant Marine will use them for the same

Above: How the English Navy uses model planes in its program to teach sailors aerial gunnery. Youths at right are building similar planes for U. S. Navy's use.

Official U. S. Navy photo.
This is the way your models will be used by U. S. Seen at 35 feet, a scale model looks like real plane at 2,500 feet.

purpose. But the greatest number of models will be needed for Air Raid Wardens, to train them to recognize enemy and friendly planes.

England has been using such models for several years to train Air Raid Wardens, Army and Navy and especially the Merchant Marine. It had been particularly difficult to train seamen in the Merchant Marine, it was found, due to the fact that shipping was on an "all-out" basis and the seamen were only in port for short periods between voyages. English authorities, therefore, worked out a plan whereby aerial gunnery and aircraft recognition schools were installed in old buses. When a ship reaches port, one of these buses immediately goes to the dock where the seamen



Here are completed true-scale models made from plans in MI by Joseph Kraus, Science Service.

HOW MANY MECHANIX ILLUSTRATED MODEL BUILDERS WILL HELP?

In order that the editors may advise U. S. officials how many model airplanes MI readers will contribute for Army, Navy and Civilian Defense training purposes, we appeal to all model builders to sign the following pledge and mail it to *The Editors*, MECHANIX ILLUSTRATED, *1501 Broadway, New York City:*

PLEDGE

I, ... (print name) , of ..... (print address)

do hereby pledge myself to build ..... (number) recognition airplane models according to true-scale plans and to contribute these planes to the U. S. Navy, the Army and the Office of Civilian Defense for whatever purposes they may wish to use them in the National War Program.

I further pledge myself to deliver my airplane model(s) to my School Principal, to my local Office of Civilian Defense, or to that person in my own home town who has been designated as the proper collector of recognition models (see text, above).

.....
(Signature)

British aerial gunnery school on wheels goes to the docks to teach seaman by means of model planes. U. S. will do same.

are assembled and given instruction on the spot.

English authorities have found true-scale planes invaluable in such training, where, otherwise, seamen would have no opportunity for aerial gunnery practice and little chance for recognition training.

It has been found, too, in England that Air Raid Wardens found it difficult to memorize the silhouettes of various types of enemy and friendly aircraft from the ordinary "recognition charts" first printed up, for this purpose.

The English experience was that it was difficult for an untrained man to look at a picture of a plane or a plane silhouette and get a proper mental picture of it. But when Wardens were shown true-scale models of these planes, they found it extremely easy to memorize the distinctive features of different types of planes.

Since all the planes to be produced in high schools of America under the Navy's program are to be used primarily by the Navy, it is obvious, therefore, that there is a great need for another source of model planes to be used by the Air Raid Warden service for other purposes in the War Program.

And that's where MECHANIX ILLUSTRATED model makers come in!

The U. S. Navy's Bureau of Aeronautics has made an arrangement with the United States Office of Education by which high school officials throughout the nation will be authorized to accept true-scale models and to pass judgement on them as to their exactness. Those models made by high school students which are accepted by the high school authorities as being exact in detail and superior in workmanship will be passed on to the Navy.

But, in addition, these high school authorities are authorized to accept and pass on models for other official uses—such as used by the Army or the Merchant Marine. This means that *anyone*, regardless of whether he is a high school student, may take his models to his local high school and be assured that, if they are acceptable, they will go into a worthy war use.

According to the United States Office of Education, *every* high school in the country is being asked to co-operate in the Navy's model program. Consequently, the high school in your own home town, wherever you may be, should by the time you read this have one

Official U. S. Navy photo

This is how your models will be used in plane recognition classes: Models are placed in long box, simulating distance.

man appointed to accept true-scale models.

In some towns and cities where there are Air Raid Warden organizations, these true-scale models will be accepted directly by the Office of Civilian Defense. If your local high school has not yet made arrangements to accept these models, confer with your Office of Civilian Defense.

It must be made clear here that these models are NOT to be sent to the Navy Department—and are NOT to be sent to MECHANIX ILLUSTRATED. The proper place to take them is to your local high school or your Office of Civilian Defense.

So that MECHANIX ILLUSTRATED will be able to advise the proper authorities as to the number of model planes its readers will produce for Uncle Sam, we have provided a pledge form. We ask that readers who wish to join this war effort sign their pledge and mail it to The Editors, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

Trained model makers will find these recognition models very simple to make—except that they must pay particular attention to the problem of getting them accurately to scale. The scale of one to 72 is highly important. Detailed plans for building a British Supermarine Spitfire II and a Messerschmitt 109E are given at the end of the article. These plans are to exact scale. Your model, when completed, should be exactly the size of the drawings.

These two models are the ones most wanted by officials, at present.

Standardization upon some definite scale has been neglected by American modelists, although our National Historic Aircraft Collection in the Smithsonian Institution has been a notable exception with its large exhibit of airplane models all to the same scale.

Usual practice, heretofore, has been to decide upon a certain wingspread dimension and build nearly all so-called "scale model" craft to this dimension. By this practice, a model of a Monocoupe 110 Special may have a wingspread of, say, 12 inches. A model of a Consolidated 32 Plane Bomber also would have a wing span of 12 inches, under the usual system. Yet the manufacturers' specifications give the first mentioned craft a wing span of only 23 feet, 2½ inches, while the bomber's wingspread is about 110 feet! True-scale models of these two planes should show them in their proper relative size.

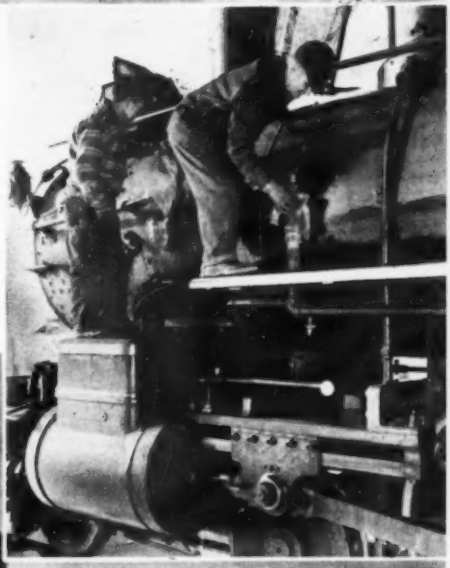
If you have saved plans of models that you have made in the past and wish to convert them to true-scale plans, it can be done by means of having your old plans photostated

[*Continued on page* 128]

Two-Man Railroad

It has only two employees, one locomotive, and no cars. But last year it made $600 profit!

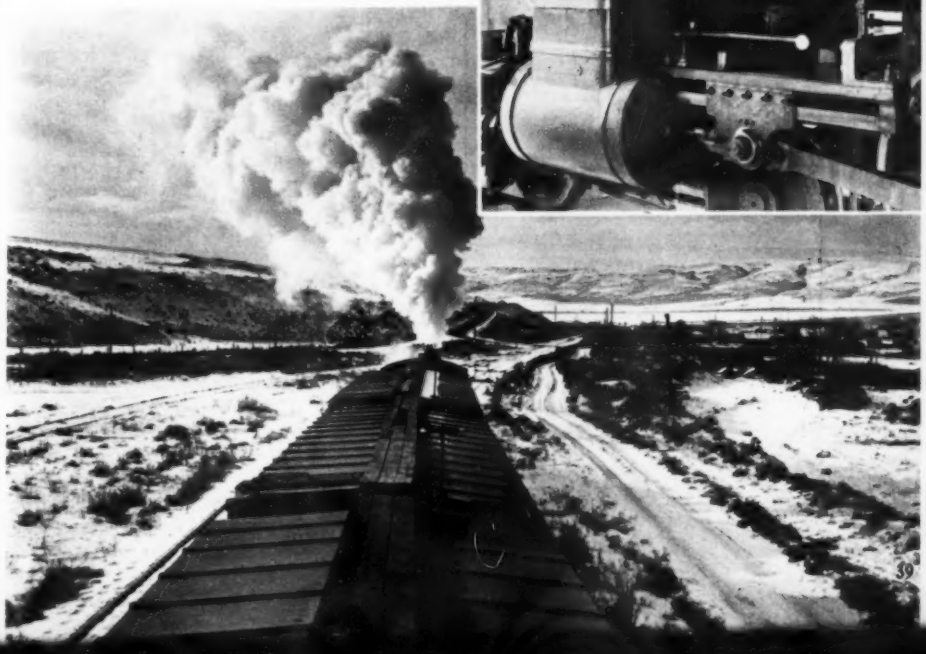
Conductor-fireman-brakeman-switchman Walter Holmes acts as section gang, too, when ice must be knocked off the rails at a crossing so that "ol' 949" can continue its 5.1 mi. run.



MANY a railroad tycoon and stockholder looks with envy at the proud record of the single-track, two-man railroad which the farmers of Douglas county in eastern Washington state have been operating since 1909.

While big sprawling transit corporations with thousands of employes and fast, streamlined coaches struggled to keep solvent during recent years, the little Waterville Railway—it

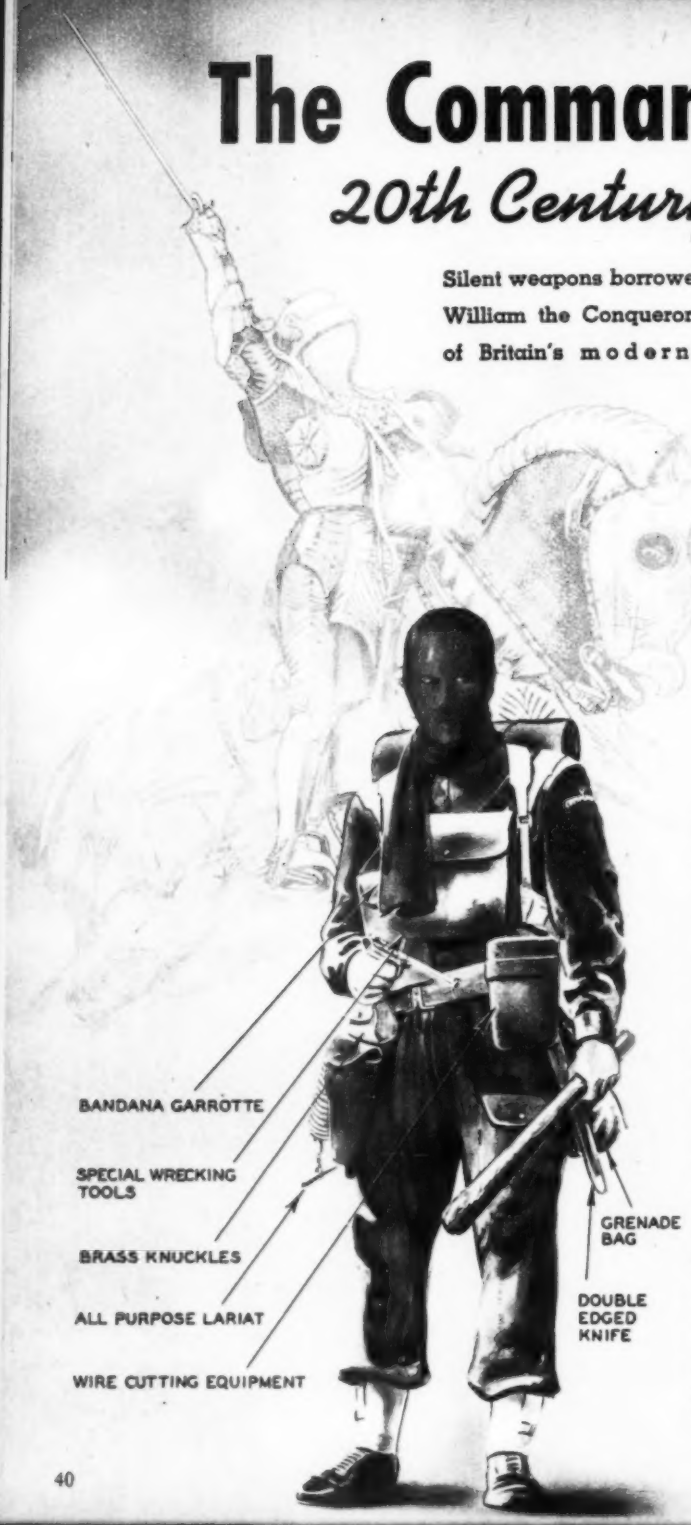
[*Continued on page* 155]



The Commandos

20th Century Knights

Silent weapons borrowed from the days of William the Conqueror are the specialty of Britain's modern Black Phantoms.



by
Bruce Thomas

I WAS with the Commandos—Britain's "Black Phantom" raiders—and for the first time saw the strange, medieval weapons they have adapted for their nocturnal sorties on enemy shores.

Through special arrangement with the British Ministry of Information, I am able to report here for the first time on a war story that has never before been told — the story of the manner in which the Commandos have gone back to the time of William the Conqueror to obtain weapons for their weird new science of "hit-and-run" warfare.

In this day of mechanical blitz, of war by chemists and physicists and scientists, can you imagine a soldier who uses a mailed fist for attack? The Commando does! He

Silhouetted against a shell flash, a Commando squad comes ashore in Norway for a "hit-run" raid. Commandos are chiefly lone operators, like the one shown at right.

uses a mailed fist exactly like those used by William the Conqueror, Richard the Lion-Hearted, and other knights of old. But for another purpose—

But before I tell you about the Commandos' new, yet ancient, science of battle, let me tell you something about the Commandos themselves.

Britain's Commando units will some day be blessed by the civilized world. We have just begun to learn of the thrilling and unbelievable exploits of this legendary band.

A combination of Captain Marvel, Daniel Boone, Robin Hood and Tarzan, the Commando is the newest element to be introduced into this wild-eyed war now being fought all over the world. He is the "super-shock-trooper" of Great Britain. As readers of MECHANIX ILLUSTRATED read in the December issue of this magazine, America is training just such shock troops for use by our forces. Although a veil of secrecy has been held over the British shock troops, we now know that Britain has been training such units for a long time, and that the Commandos have been in action for nearly a year.

What is the purpose of such units? I am not allowed to say, specifically. But we are safe in assuming that their main purpose is this: When England and America start their invasion of Hitler-occupied Europe, they will know exactly what ports and beaches on the long European coastline are most vulnerable to attack—and they will know this through information resulting from the long series of coastal raids carried out by the Commandos!

Of course, the Commandos have many other

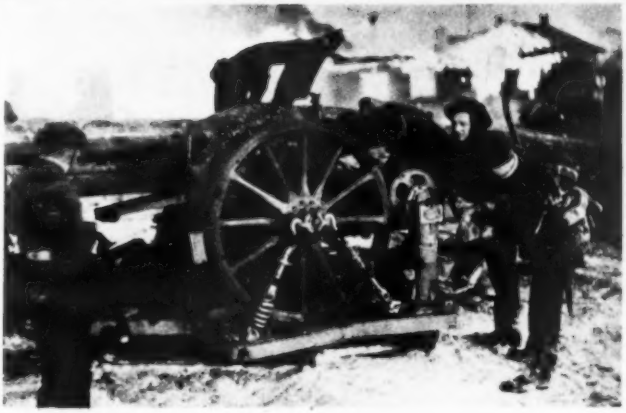
A coin tied in a bandana is the Commando's garrotte. Coin, whipped over the larynx, crushes it when garrotte is tightened, preventing an outcry.

objectives. They cause panic among the enemy forces. They force the Nazis to divert strength from other battle fronts to the Coastal areas, in order to guard against Commando attacks. They capture Nazi officers (remember the Commando raid in Libya when they almost succeeded in capturing General Rommel, commander of the Nazi African forces?). They disrupt enemy communications. They furnish liaison with the underground forces in Norway, The Netherlands, and France who are carrying out the V for Victory campaign. They organize sabotage. They perform a hundred vital missions.

But I believe we are safe in saying that, chiefly, they are the advance guard for eventual invasion. And when that invasion begins, the Commandos will be its leaders!

What sort of men are these Commandos? Among those I talked to were many who had volunteered for service in the "Black Phantoms" because they had lost a baby, a wife, a sister or a mother during the Nazi air raids

The striking picture below, taken on an actual Commando raid, shows a landing barge approaching the enemy's shore.



Commandos are shown loading captives into one of their raiding barges in the photo above. At left, the Black Phantoms are wrecking a German gun.

over England. There were a sprinkling of Polish and Free French, who had lost everything to the Nazi destroyer. There were others who had lost pals, or brothers in battle. So most of them were in the Commandos because of a private "V" campaign of their own—not a "V for Victory" campaign, but a V for *Vengeance!*

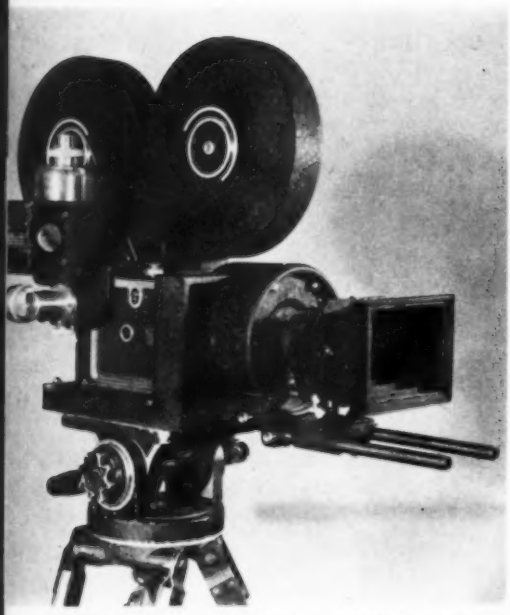
The days and nights I spent with the Commandos "someplace in the British Isles" were by arrangement with the Ministry of Information. I went to their camp and lived and ate with them. I accompanied them as they started on one of their raids. I was not permitted, naturally, to ride with them across the choppy English channel on their deadly mission—for such sorties are too secret even for newspapermen to witness. But I was permitted to wait for their return, and from their own mouths I learned firsthand all about their raid. It was then that I learned the amazing story of their adaptation of medieval weapons.

When I arrived at their camp "somewhere in England" I thought for a moment that I was back in a hobo "jungle" in America. The Commandos live in the woods, under conditions that parallel as closely as possible the conditions they will meet on their raids. Their camp is a proving ground.

"Problems" are laid out for the Commandos on their own grounds, in such a manner that for weeks before they set out on an actual raid they can practice every move they will make until each man in the unit is letter perfect in his part.

[*Continued on page* 147]

THE SHIVERING LENS



A standard Mitchell movie camera equipped with a shivering lens system takes films like that at top of the next page.

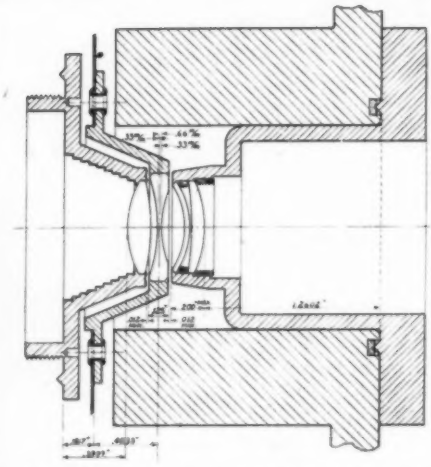
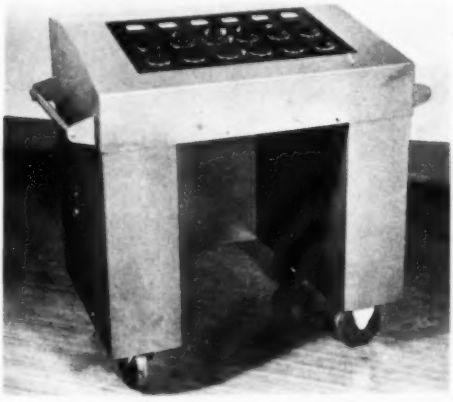


Diagram shows the double-concave lens, a floating structure which is oscillated by electricity 13,200 times per minute.



This control console, operated remote from the camera, supplies alternating and direct current, or both blended.

A NEW system for obtaining natural depth in photography awaits only the end of the war to put present-day camera results, fine as they are, in the technical past with daguerreotypes and early "flicker" movies.

A sweeping and drastic statement, that. Yet no less importance can be attached to the proof-supported claims of the responsible persons concerned in the invention, manufacture, and use of the new "electroplane" camera. Its heart is a lens so designed and constructed that it operates on the principle of the human eye—it automatically adjusts its focus without changing the size of the image, thus producing on film the same illusion of depth as seen by our eyes! The necessary oscillation of the lens has earned it the name "shivering lens."

The photograph here of a youth, an enlargement of a 35 mm. frame made with an "electroplane" camera, clearly suggests the reality now at hand in moving pictures and studio stills. The young man has form and substance in an effect no snapshot or posed portrait has previously obtained. Though this new lens system has most obvious benefits for movies, it is as readily adaptable to studio cameras and to television. But every prospective user will have to await the war's conclusion because lens and camera makers are absorbed in war work.

But when the lens is adopted—producers' prejudice must be overcome, just as in the case of sound—you'll be going to color movies which will show your favorite star on the

CAMERA

Natural depth photography is obtained with this lens-system once 'optically impossible'!

screen in such a beguilingly realistic manner that you'll swear you're seeing and hearing real persons performing! The making of color movies will be simplified (accelerating the trend to them) because the "electroplane" camera will focus as sharply on objects and persons far from the camera as on those nearby; in close-ups now, background colors often are blurred, have you noticed? Avoiding such blurs has given daily headaches to color-movie directors, and the planning resorted to has made such productions slow and costly to make. The new lens-system will say goodbye to the single plane of critical focus now limiting color movies. It also will free actors from the chalk-lines which they're forced to walk in order to keep not only in range but in focus of the present-day camera.

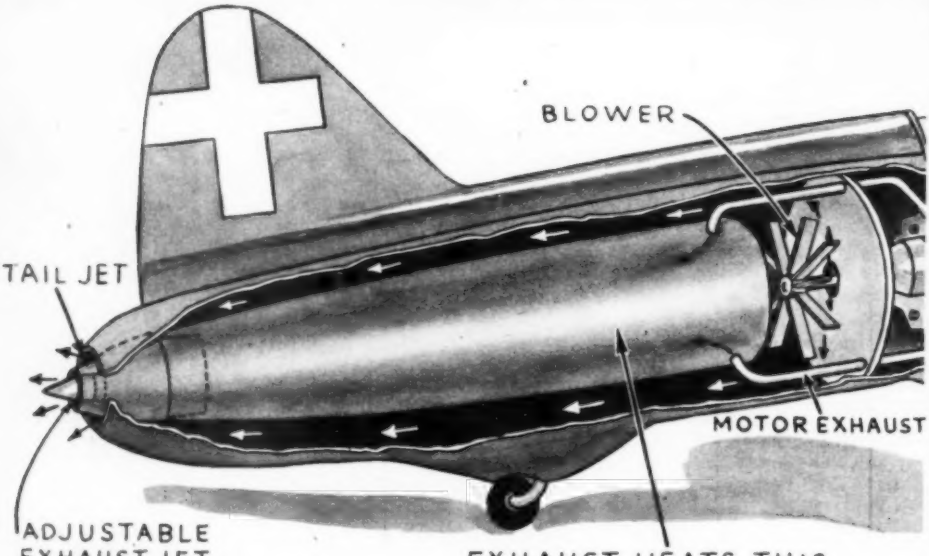
To users and takers of still photographs it seems equally important—certainly it is equally revolutionary—that the new lens-system is as applicable to their cameras as to movies. When an "electroplane" camera is being used, a model will not need to remain rigidly posed without a muscle moving for fear a part of her body or garment will deviate from a position on which the focus of the whole composition is based. Repeated exposures of a subject to make sure that at least one print will not be blurred, and retakes, with the expense they imply, will be eliminated.

Discussion here relates largely to moving-picture photography, because research and initial uses of the lens-system have been in that field.

[*Continued on page* 161]

Enlargement from a frame made with "electroplane" movie camera shows the natural-depth possibilities. Compare with the unavoidable blur of everything beyond child's figure in the nevertheless excellent and prize-winning photograph below. The new lens-system is not limited by shallow plane or critical focus.

THIS PLANE FLIES



Air is drawn into C.C.-2 by blower somewhat like those in home oil burners. Internal cone is probably used to heat blower air, control exhaust. Artist's version above shows principle, not dimensions.

by George Daniels

Mechanix Illustrated Aviation Editor

AS SIGNOR SECONDO CAMPINI sketched out the design of his first jet propulsion monoplane, he may well have entertained a hopeful vision of vast *propellerless* bomber fleets hissing weirdly through the cirrus. Perhaps he chuckled to himself as he conjured up a mental picture of the ground below. The anti-aircraft batteries and the giant searchlight stations would still be waiting for their signal to go into action when the bombs had already begun to fall. Detector crews would rub their eyes and scan the heavens, vainly waiting for some faint sound in their earphones, but none would come until *after* the plans arrived!

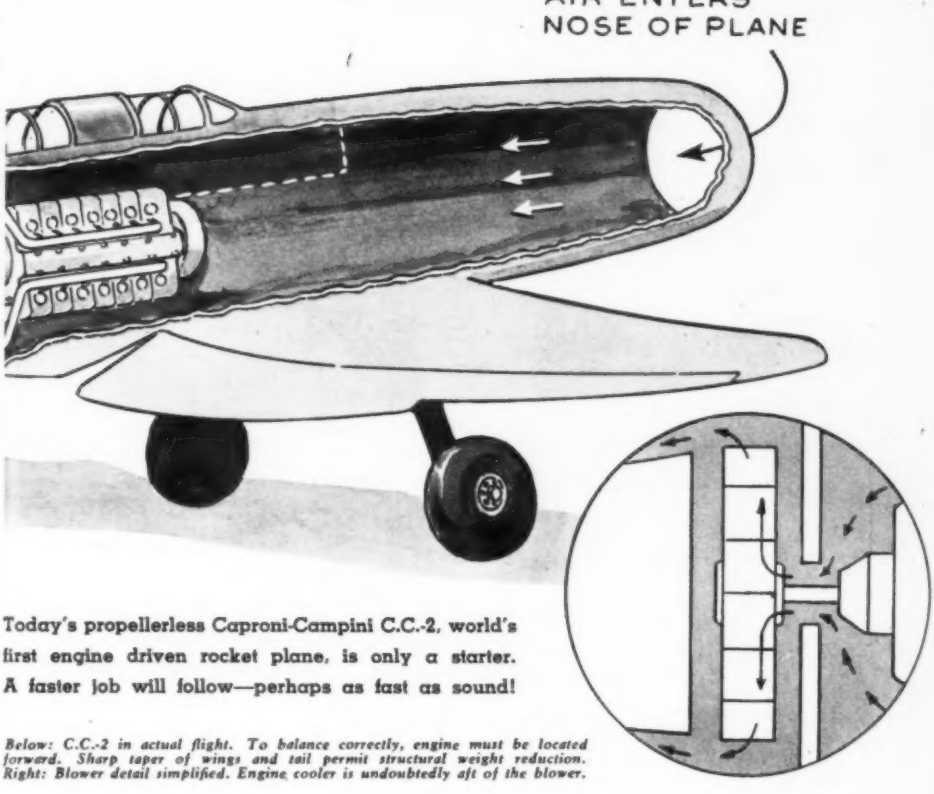
Perhaps he fancied that Gianni Caproni's great Societa Italiana Caproni would reward him with a bonus—and maybe they will. It seems that he's really got something. His first attempt at jet propulsion was apparently hampered by a lack of confidence in the principle. The ship, designated as the C.C.-1, resorted to a conventional propeller for the takeoff, and switched over to jet propulsion after it got in the air. It weighed nearly 4½ tons—but it's a shrimp compared to the 11,000-pound C.C.-2 which is now gathering laurels for itself and its designer.

The C.C.-2 has no propeller at all! And it actually flies!

From all available information, Signor Campini, with an airplane that flies minus a propeller, has achieved the most revolutionary advance in aeronautics since the Wright brothers first took to the air!

The jet propulsion idea must have come easily to Signor Campini, as Italian scientists and experimenters have long been curiously fascinated by the idea of air blowing through a tube. Everyone has heard of a Venturi tube at one time or another. It's in the carburetors of our cars and our planes. But Campini may have gotten his idea from a Swiss scientist named Daniel Bernoulli. Way back in 1738 Bernoulli dreamed up an idea for running a boat by squirting water out of the stern. That.

WITH NO PROPELLER!



Today's propellerless Caproni-Campini C.C.-2, world's first engine driven rocket plane, is only a starter. A faster job will follow—perhaps as fast as sound!

Below: C.C.-2 in actual flight. To balance correctly, engine must be located forward. Sharp taper of wings and tail permit structural weight reduction. Right: Blower detail simplified. Engine cooler is undoubtedly aft of the blower.

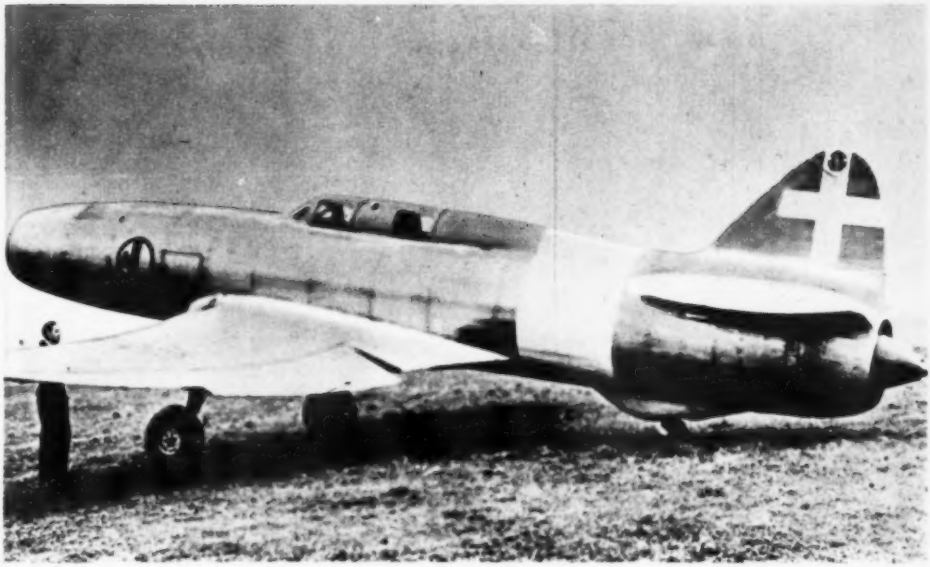
A few seconds after a standing start Von Opel rocket race car was doing better than 100. Railroad version blew up at over 200.

perhaps, was the first jet propulsion plan. He didn't stop at that, however, but turned out a book full of theories—several of which are responsible for most of the major advances in aerodynamics up to now! When Campini calculated the characteristics of his wing section, the pressure in the air tube of his plane, from nose to tail—and in the jet—he had to use Bernoulli's theories.

The C.C.-2 is really an engine-driven rocket plane. The air driven at high velocity from the tail jet drives the ship in the same manner as the hot gasses emitted from the combustion chamber in conventional rockets. The secret lies in forcing the air through the tail jet at an extremely high rate of speed. Newton's Third Law of Motion, "To every force there is an equal and opposite reaction," does the rest of the job. The high kinetic energy of the outrushing air causes a reaction which pushes the plane in the opposite direction — forward.

All this is much the same as the usual comparison between the "kick" of a gun and the

Herr Pietsch built this one. Spherical fuel tank affords greatest strength for high pressure fuels.



Ground view of C.C.-2 shows adjustable tail jet cone to regulate jet propulsion air stream. Smaller cone valve can be seen at end of large cone. This undoubtedly jets exhaust independently. Cockpit is shallow so as not to interfere with flow. Additional impetus may be added by exploding special fuel charges in the central tube or near the tail jet.

flight of a rocket. It may seem surprising, however, that a mere rush of air could have a force comparable to the flaming blast of a skyrocket, but it has. And it's much quieter! If you want a demonstration of air-jet propulsion, simply blow up a toy balloon and then let go of it. The air rushing out of the neck of the balloon will send it darting all over the room. In other words, it becomes a little jet-propelled blimp—until the air's exhausted. It doesn't make much noise either.

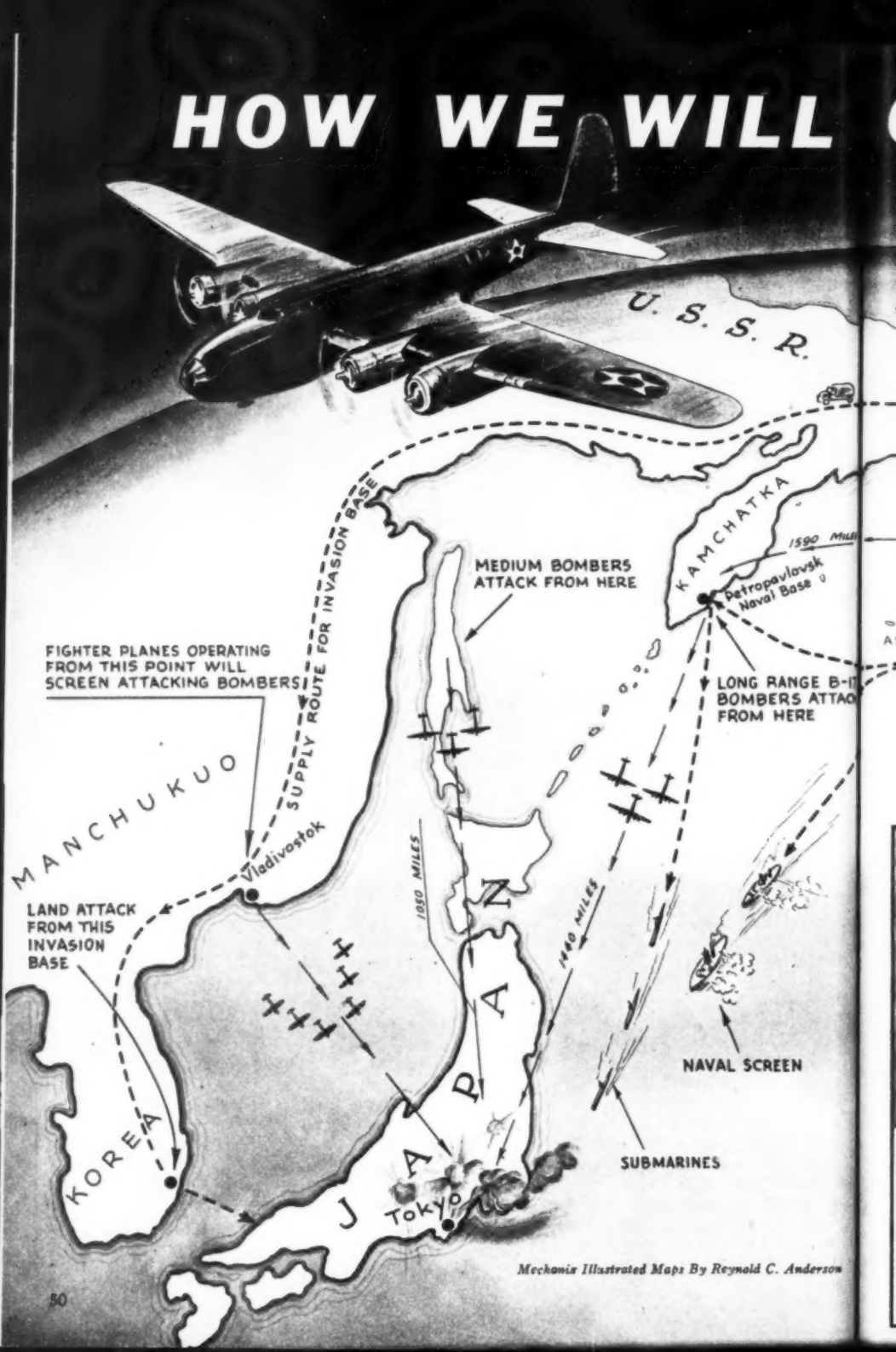
That brings us back to the possibilities of Campini's machine. Engineers have known for quite a time that silencing the engine alone won't kill the noise of an airplane. The propeller makes plenty of racket all by itself. The sound of an electric fan will illustrate that point. Without the fan blades on the shaft, the fan's electric motor is practically noiseless. Well, the Signor has eliminated the propeller entirely. The exhaust becomes a steady tone, and then as the Campini idea is to outrun sound, future planes would arrive before their own noise anyway. The noise is reported to be a healthy hiss, rising to shriek proportions only during the takeoff. An early experimental model was described as "sounding like a sulking cat—part hum and part hiss."

The blower that drives the air through this strange ship is very much like the one in a domestic oil burner. It's not unlike a super paddle wheel. When it turns at high speed the centrifugal force throws the air outward toward the rim, creating a lower pressure or partial vacuum at the center. Air rushes in through an aperture around the shaft, to fill the partly evacuated area. The air that is "hurled" out toward the rim is deflected back through the hollow fuselage, being heated en route by the hot exhaust gasses. A central duct is probably used as a combination exhaust expansion chamber and air heater. Although the Italians have implied that the exhaust is released directly into the blower-driven air inside the fuselage, they offer no explanation for the as yet unmentioned secondary jet in the tail. This jet (plainly visible in photos) is located near the apex of the conical main jet regulator valve. Its purpose may very likely be the independent control of exhaust back pressure. Designer Campini and Boss Caproni have undoubtedly copied the Northrop technique by building a "flying mockup" designed to permit a maximum number of changes with a minimum of time and labor.

The engine itself is designed for high r.p.m., as a centrifugal blower of the type employed becomes efficient only at higher speeds. Engine cooling, of course, offers no problem in the C.C.-2. With the powerplant close-

[*Continued on page 160*]

HOW WE WILL

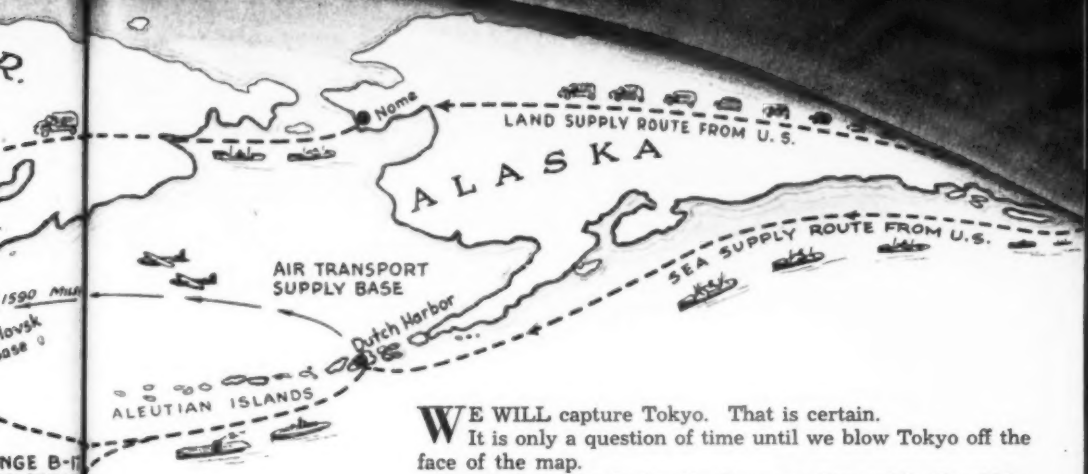


Mechanix Illustrated Maps By Reynold C. Anderson

L CAPTURE TOKYO

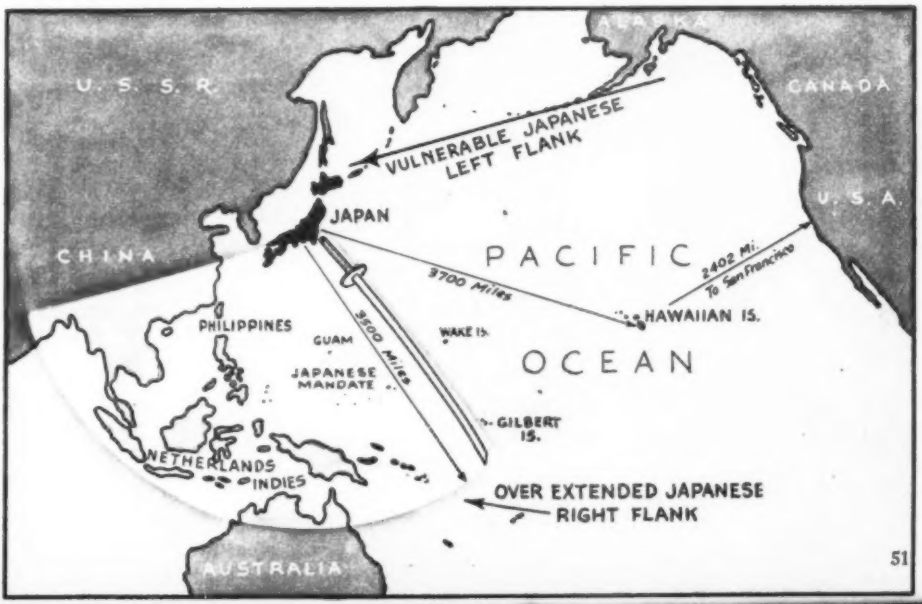
by Major Malcolm Wheeler-Nicholson,

Formerly Military Attache to the Japanese General Staff.



WE WILL capture Tokyo. That is certain. It is only a question of time until we blow Tokyo off the face of the map.

Having been attached to the Japanese General Staff as Military Attache for the U. S., I know the fear of the Japanese military mind for the might of the U. S. I know that now, in Tokyo, blood is being sweat in fear of the sure attack that is coming.



Above, one of the new giant Army transport planes built by Curtiss-Wright, which will play an important part in carrying supplies to our bomber bases in Kamchatka.

Japan Can Expect U. S. Fleet Attack, Says Navy Official

By WENDELL WEBB

PEARL HARBOR, (AP).—A definite warning that Japan itself could expect the same sweeping and destructive assaults as were visited on her mid-Pacific islands Feb. 1 came today from Navy officials.

"This long-distance attack by the U. S. task force demonstrated how the war can be taken directly to the enemy's doorstep regardless of distance," one officer said.

It was disclosed that the ships participating in the blasting of the Marshall and Gilbert islands had been at sea at least three weeks, some much longer, and that the force traveled in excess of 10,000 miles.

It is only 4,000 miles from Hawaii to Tokio.

Other Operations Secret

All the time spent at sea was not devoted to traveling to the island objectives, which were but 2,000 miles away. Other operations, however, were not disclosed.

A Victory For U. S

MAJOR WHEELER-NICHOLSON SAYS:

"If Russia wishes to remain neutral toward Japan, then let her lease to the United States her bases in Kamchatka and Sakhalin under the Lend-Lease Act, in return for supplies we are giving her."

I propose here to outline how we will whip the Japs.

In Admiral Nimitz' recent statement that we will carry the war to Japan's front door is the answer to our eventual victory over the Nipponese. Not until we have destroyed the malignant spider of Japanese militarism at the center of his far-flung web can we be assured of his defeat. That center is Tokyo, the headquarters of Japanese economic, political and military activities, a city of 6,500,000 inhabitants sprawled over 217 square miles.

In addition to arsenals, communication centers, and airfields, its great Tokyo-Yokahama industrial district, containing munitions factories, shipyards, piers and shipping, stretches some eighteen miles from the middle of the city. All-out attack on Tokyo would not only paralyze the great shipyards, of which the mighty Ishikawajima Shipbuilding yard is one example, but would disrupt ocean shipping and rail communications with Kobe, Osaka, Nagasaki, Hakodate, Sasebo and other great industrial centers and naval bases.

The far-flung military, naval and air forces of Japan in Manchuria, China, the

Taken several years ago, when the Jap Army staged a test air raid, this photo shows how Tokyo will look when United States B-17 bombers start dropping their deadly loads on the Japanese capital.

Philippines, Malaya and the Dutch East Indies are absolutely dependent upon the smooth and uninterrupted functioning of their supply and command lines, all of them centering in the crowded rabbit warren that is Tokyo.

The battle of the Pacific will not be won by repelling Japanese attacks on far-flung island outposts in the South Pacific. The sooner we get in a deadly blow at the nerve center of the Japanese spider web, the sooner will the war be ended in victory for the United Nations.

How is that attack on the main objective to be achieved?

Examination of the map discloses that Japan occupies a secure position, at the moment, but a position that could be rendered insecure

[*Continued on page* 163]

No Blackout For America!

SanFrancisco tries to black out. As the photo shows, it was not very successful. Mr. Hibben says a "dimout" would succeed.

by S. G. Hibben, *Westinghouse Director of Applied Lighting*

As Told To A. Richard Fiske

IN MODERN war there is no safety in darkness. No blackout, regardless of how black, can make American cities immune from Axis bombs. Enemy night raiders over American metropolitan centers may send explosives plunging earthward to wrack terror, death and destruction regardless of protecting mantles of darkness.

The truth of this is indicated by experience in Europe, where the bomber has not been balked by blackouts. Suburbs, business districts, defense areas were not spared. Moonlight revealed targets. Rivers and waterways pointed out objectives with silvery fingers. Incendiary bombs sparked fires that blazed like torches. Parachuting flares illuminated the earth. Radio beams crisscrossed like invisible X's marking spots where bombardiers should release their loads.

Here, as in Europe, there may be more danger, more destruction, more civilian casualties resulting from long total blackouts than from incendiaries, aerial torpedoes, and all the other enemy pills of death dumped upon our doorsteps. In London, during 1941, there were more than 10,000 casualties, killed or injured, as a result of blackout accidents.

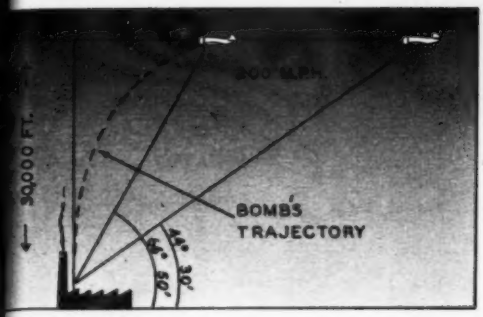
Off hand your immediate reaction is, "Then why have blackouts anyway? Let's leave all the lights on." This, of course, is silly. It is too extreme and far too dangerous.

Perhaps the answer lies somewhere between an extreme blackout and the imprudent policy of letting all lights blaze with peacetime brilliance.

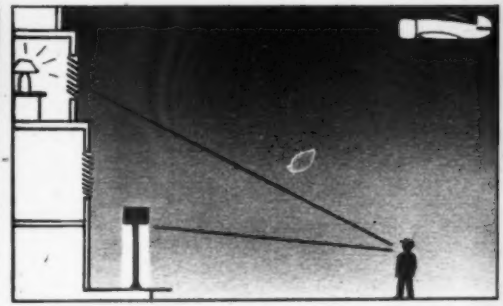
There is merit and value in a modified form of the blackout, perhaps a "dimout" coupled with camouflage. Such a defense would be tailored to American needs.

It would be based upon the assumption that unless and until the enemy can establish air bases close to our shores, from which huge squadrons of heavy bombers can take to the air, we must protect ourselves against hit-and-run raiders.

Attacks upon cities would be of comparatively short duration by relatively small flights of high-flying, hurrying enemy planes.



A bombardier at 30,000 feet must take his first sight at a distance of 5¼ miles. He must, therefore, sight at an angle of 44 degrees, 30 minutes. Hence, he cannot see light rays slanted earthward at any angle below that one, Mr. Hibben says.



This diagram, suggested by Mr. Hibben, shows how lights may be slanted earthward in a "dimout" rather than being blacked out entirely. Windows need not be completely covered, streetlights only be shaded so light goes down.

The "Dimout" is the answer, says this scientist of lighting—and he gives convincing arguments in favor of it.

Mr. Hibben, the author, shows new transparent plastic which, held at a 45 degree angle, becomes opaque. It could be used for plant windows.

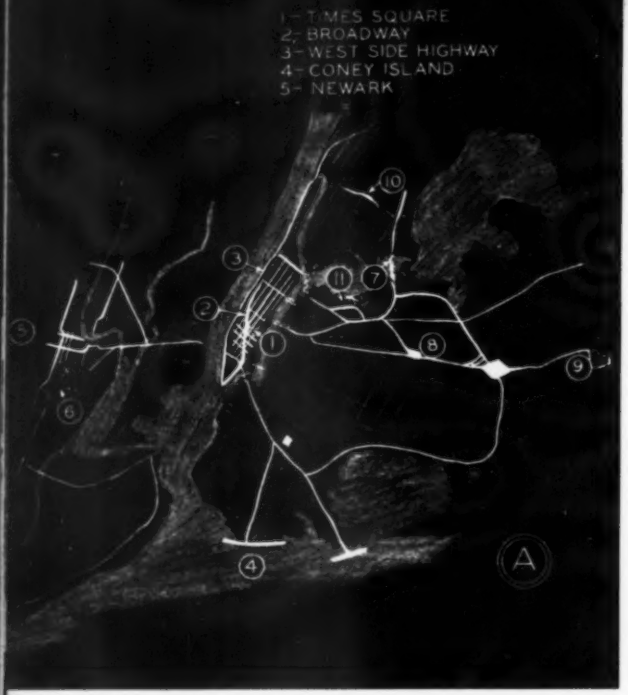
Scudding from the decks of aircraft carriers at sea, these would of necessity be light bombers with limited cargos.

They would roar through the night seeking to locate vital military objectives. On a clear night at 20 to 30 thousand feet, a bombardier would have approximately 50 square miles spread out below him in a gigantic panorama.

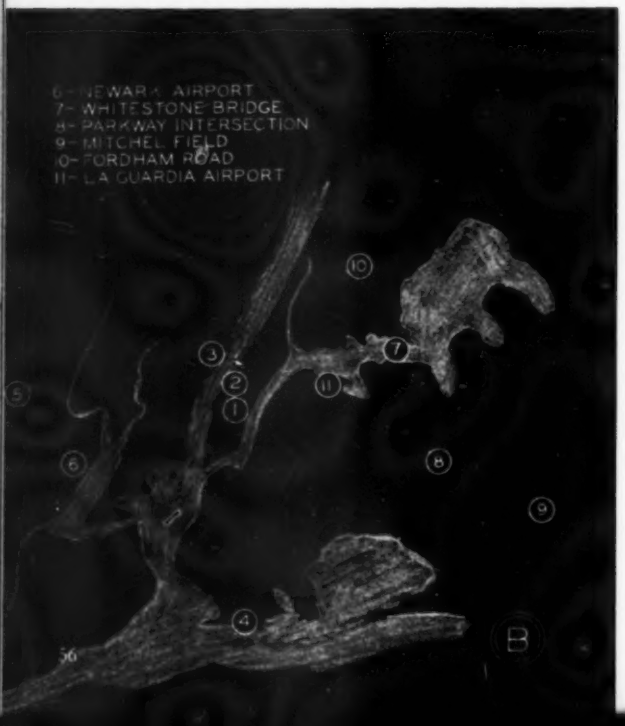
Under ordinary conditions tiny fireflies of light would twinkle here and there from farm houses in the open country. Scattered like clusters of golden diamonds, cities and towns would glow dully in irregular patches. Rivers would meander across the dark earth like veins of quicksilver. The navigator's task would be to observe all this, find orientation points or landmarks, set a course, and estimate when and where to release bombs.

The problem is plain. Everything possible should be done to confuse the night raider. Military objectives must be difficult to locate. But at the same time, important activities on the ground in production areas, in transportation systems, in civilian life, should be disrupted no more than absolutely necessary. A vital consideration, too, is that once a raid is over, life and lighting should be capable of returning to normalcy almost immediately.

If a bombardier can be befuddled for only a second or two, he's not going to hit his target, providing that he has found it. Flying at 30 thousand feet and at about 200 miles per hour, he has no more than a minute in which to spot his objective, adjust his sights and release his



The painting above shows how New York City looks from the air at night. Notice how light clusters outline principal highways, bridges, etc. Mr. Hibben argues that if these light clusters were eliminated in a "dimout," a flat, even light effect such as that shown in the picture below would result, and that bombers, lacking any landmarks from which they could estimate the location of targets, would be more confused than in a blackout.



bombs. At five and three quarters miles away the bombardier may sight his target. Sixty seconds later, when he is two and a half miles away, he must cut loose his bombs, which zoom forward and downward in a great arc. If all has gone well and calculations are correct, he hits his target on the nose.

But if a bombardier, confused for a split second, misses, or if he fails completely to locate his objective, or is fooled into dumping his bombs upon decoy targets, the defensive plan's major purpose will have been achieved.

It is possible that 90 per cent of the defense job may be done if map patterns were scrambled and outstanding landmarks obscured, camouflaged or blacked out entirely. Lights on bridges, traffic circles, curving lines that mark highways, prominent electric signs, and long straight runs of brightly lighted traffic arteries, might be dimmed or turned out so that they would be invisible or so altered in appearance they would mean nothing.

Particularly along rivers and water fronts, lights should be turned off because their reflections on the water would be visible from the air, even though they might be shielded. Such reflections might indicate docks or industrial plants. Nothing beyond this can be done about bodies or streams of water, which can almost always be seen from the air even on the darkest nights.

One plan would scatter fake objectives over the landscapes. Deserted roads might be made to resemble major highways by stringing lights along them and by creating phantom traffic circles. Factories, perhaps, could be simulated by properly placed lights in an empty pasture. Other open spaces could double for airports with help of clever lighting. Lamps could be strung across rivers to look like important bridges from the air.

[*Continued on page 150*]

DeMill a gadg into a to vie see h rigged camera

And t when ented 2,000 onto (right "Resp

MECHANICS *plus* GENIUS *equals* ART

Cecil B. DeMille, inventor, takes a bow and tells his success formula.

by Hoyt Barnett

"MR. DeMILLE, it can't be done!"

That is a phrase to wave in front of Cecil B. DeMille only if you want to see tradition smashed and history made.

For here is a little-known fact explaining the secret of Cecil B. DeMille's tremendous success in Hollywood: DeMille, first and foremost, is a master mechanic!

Few know, for instance, that DeMille—the movie maker—founded the first regularly scheduled airline in America!

His inventive genius, his flair for mechanics, is the basic reason for the accomplishment of

DeMille in action—with a gadget! You can't see into a technicolor camera to view the scene—but see how DeMille has rigged a telescope on camera for same effect.

And this is what happens when DeMille's patented "sea scoop" throws 2,000 gallons of water onto one of his sets (right). From his movie "Reap the Wild Wind."

DeMille is a master model builder. Above, a complete scale set of one of his movies. Below at left, a "blimp" sound camera, the idea for which DeMille originated, as compared with an old-style silent camera, shown at right.

his artistry. When he conceives a mighty spectacle or a new movie effect, and they tell him, "Mr. DeMille, it can't be done!" Mr. DeMille invents a new device or a new technique—and does it!

Few people realize that posterity might very well remember Cecil B. DeMille as an inventor, were his fame as a producer less.

DeMille wanted his camera to move in an arc and "peek" into a second story window They told him, "Mr. DeMille, it can't be done."

So he invented the basic idea of the moving camera boom!

DeMille wanted only half of an actor's face to show on the screen. When they told him it was impossible, he devised the first movie spotlighting system!

DeMille wanted a giant set for one of his spectacle scenes in "The Ten Commandments." "It can't be done," they said. So DeMille laboriously built a model, showing them exactly how it *could* be done!

DeMille wanted to take his camera out of the soundproof glass house in which it had been jailed with the advent of talkies. "Impossible!" they told him. So he invented the so-called "blimp" which liberated the sound camera from a static position!

The list of his mechanical achievements could go on endlessly, until we lost sight of the man, himself. So let's take a look at the man whose initials, "C.B.D.," could as logically stand for "Can Be Done!" as for Cecil B. DeMille.

The mechanical aptitude of this veteran motion picture producer is but one of many facets of his agile mind. It has been polished by the necessity for surmounting technical obstacles between him and his goal—the production of pictures for profit.

"There is nothing emotional in pictures except what the public sees on the screen," he declares. "The rest is hard dollars and common sense."

In order to avoid an emotional approach, DeMille has reduced the complexities of his flicker factory to the simplicity of a salmon cannery.

"We are in the business of canning art," he explained. "You must put it in a can so it may be delivered to the exhibitors. But it must be art or it will not sell."

In these words he condensed thirty years of experience as a top hand in the canning factory of Hollywood, and he should know for he has "canned" such art as "The Ten Commandments," "The King of Kings," "North West Mounted Police," "Reap the Wild Wind," and 62 others.

As seasoning in this canned art he has given the public such famous players as Gloria Swanson, Wanda Hawley, Agnes Ayres, Leatrice Joy, Florence Vidor, Vera Reynolds and many others.

DeMille is a solid sort of man today, about average height, but with a rugged appearance that makes him seem younger than his 60 years. His features are prominent and sometimes his smile is almost mischievous.

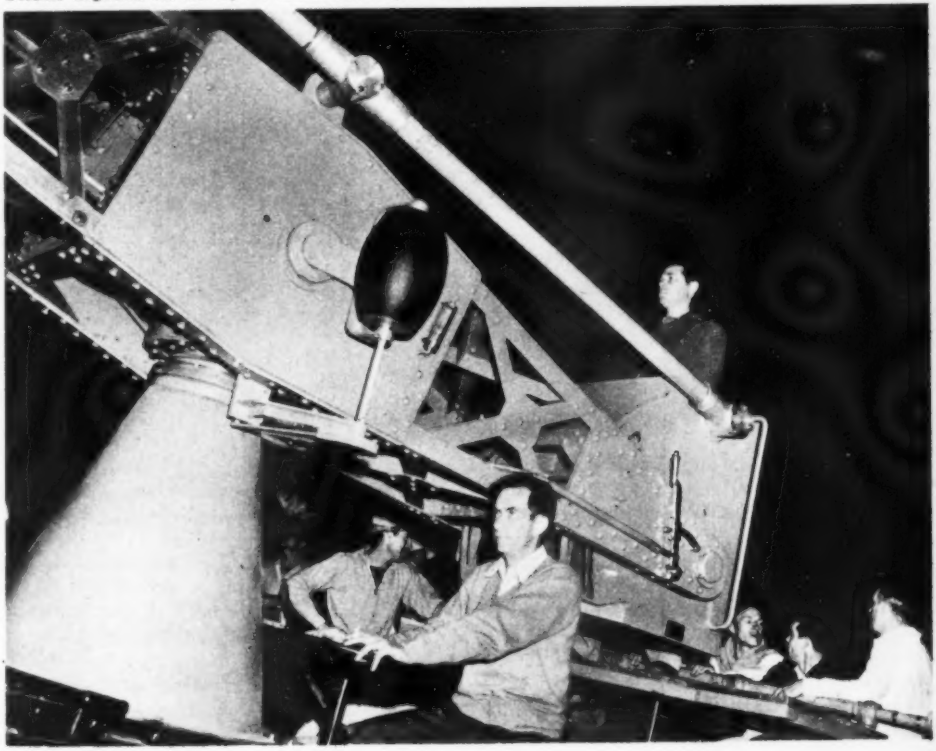
He has two contradictory characteristics, a nervousness that propels him about his rather spacious office, and a stolid acceptance of the necessity of attending to details.

There is a certain disorderliness, too, in the way he piles things here and there, but this, likewise, is not a dominating trait since on a table near his desk is a neat row of books on Mexico, tabs of paper marking passages he considers pertinent to his next picture dealing with the federalized constabulary of that country, the Rurales.

Life has been a continual adventure to this maestro of the movies. His entrance into the business was spiced by intrigue, treachery and high-finance. DeMille, then a stage producer, became associated with Jesse L. Lasky, a minor theatrical producer, and Samuel Goldwyn, a glove salesman. DeMille's brother, William, a successful playwright, refused to join although $5,000 would have

One of DeMille's mechanical masterpieces is this huge squid.

DeMille originated the idea of the camera boom, after he had been told it was "not possible." Below, a modern boom.



purchased 20 per cent of the enterprise.

No one had ever made a "feature length" movie. Every one told DeMille that it "couldn't be done." So Cecil took the company West to make "The Squaw Man." Dustin Farnum, the star, turned down 20 per cent of the company as his salary, insisting upon $200 a week. Four years later either Farnum or Cecil's brother could have dragged down a cool $2,000,000 for the shares they spurned.

But that is ahead of the story. An existing company tried without success to sign DeMille and his associates to a releasing agreement. DeMille remembered this incident when he began shooting in California. At the same time it occurred to him that he was exchanging dollars — his dollars and all he had of them—for exposed motion picture film, which is fragile stuff at best. So he surreptitiously shot each scene in duplicate, sending one developed take to the office and slipping the other into the attic of his home.

DeMille's favorite hobby is walking about the ocean floor in his sea helmet, shown in the photo.

When shooting was completed the company not only had spent all the money it had, but about $5,000 besides. The negative film thus represented all the money in the world, as far as DeMille was concerned. He edited the film and sent it to a laboratory where projection prints could be made, but here sabotage struck. Someone twisted and scratched the delicate emulsion so it could not be printed.

Without a word of complaint DeMille took a trusted employe, the film he had cached in his home and a great big pistol to the station where he caught a train East. By the time he arrived he had edited the film into a picture that grossed more than a quarter of a million dollars and launched him on a career no other man has equaled in Hollywood.

"The Squaw Man" had been DeMille's answer to those who said, "You can't make a feature-length picture," "You can't release the picture independently," and "You can't make it pay." He next encountered the "you can't do it" boys when he decided to light only half a player's face with a spotlight in a close-up in "The Warrens of Virginia."

This seems simple now, but in those days motion pictures generally were made in sunlight balanced by reflectors and even closeups were considered radical.

Shortly after the finished prints of the picture reached New York, DeMille received a wire from Sam Goldwyn. It said:

"Exhibitors complain because they can see only half of actor's face in Warrens of Virginia stop Offering us half price stop What shall I do question"

DeMille paced the floor. Half price meant bankruptcy. Then a cherubic smile replaced the frown. He grabbed a pencil and wrote:

"Thought anyone would recognize Rembrandt lighting stop Charge exhibitors double stop"

Sam arose to the heroics of the occasion and so "effect lighting" was born.

The next foible smashed by DeMille had to do with the movement of a camera. The situation, as he recalls it, was like this:

"I wanted the camera to move from ground level, swing in an arc and look into a second story window. In those days a camera could be moved along the ground on a dolly or lifted vertically with a jack. It could not be moved in an arc as it was lifted.

"I explained what I wanted, but the camera chief said, 'But Mr. DeMille, it can't be done.'"

DeMille then sent a property man for a strong step-ladder, a long plank and several sandbags. The plank was balanced across the stepladder and tied in place. The camera and the cameraman were placed on one end of the plank, sandbags on the other.

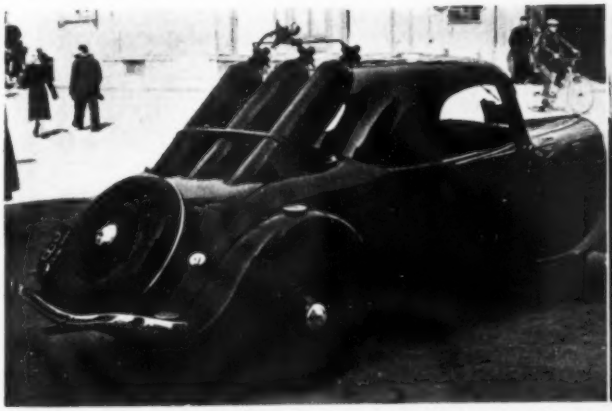
"Then," relates DeMille, "I took hold of the sandbag end of the plank and pulled down and sidewise. The camera moved up in a graceful arc and looked in the second story window."

Mitchell Leisen, art director for DeMille at that time, used the DeMille principle and

[*Continued on page* 168]

Gazogene, a charcoal product, is used in this power kettle crudely placed in the luggage compartment of a previously-swank Renault in occupied France. Riviera bus needs a trailer and a stoker now!

WILL WE COME TO THIS?

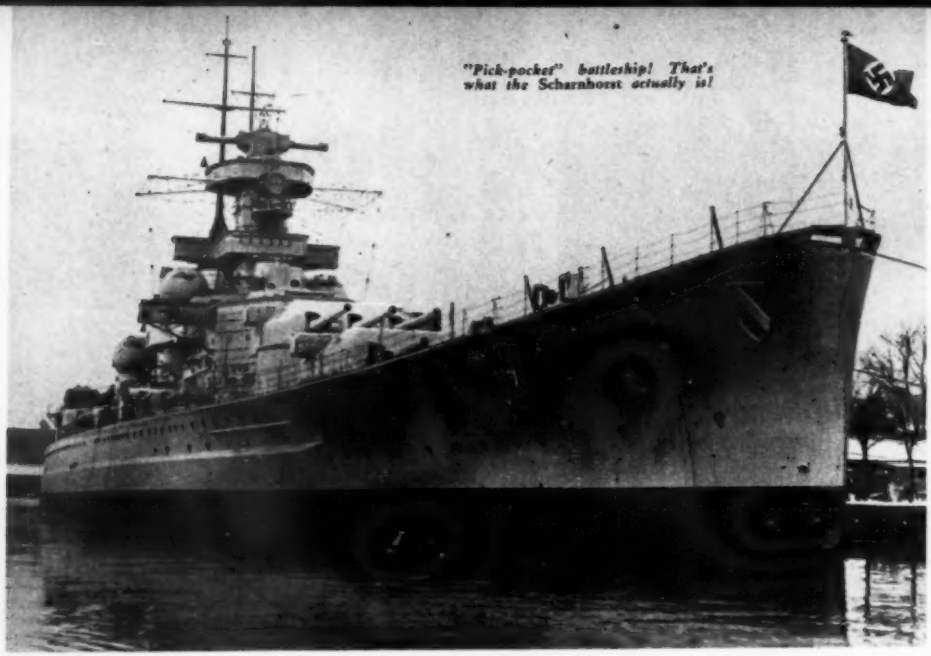


Acetylene tanks or a one-wheel trailer-kettle are sad makeshifts to which autoists in Nazi-conquered Europe are resorting.

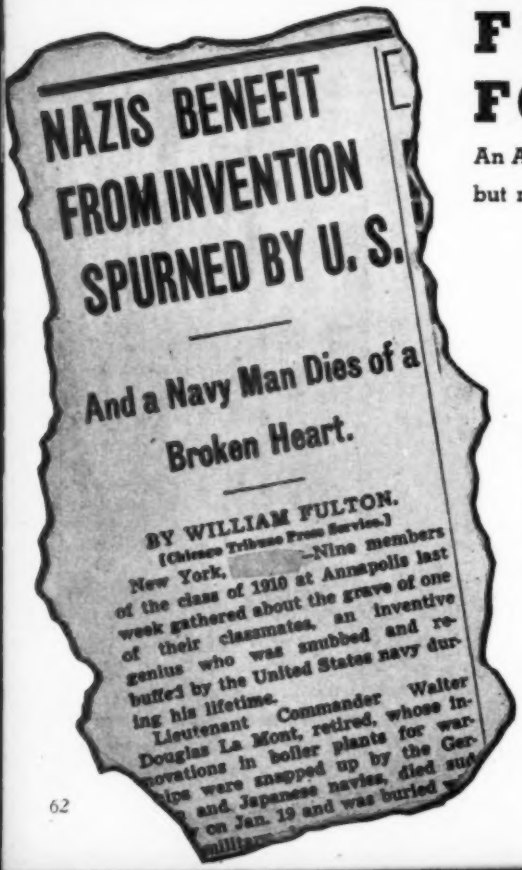
THESE photographs of automobiles and busses in Nazi-held Europe have a grim significance for Americans. With oilfields in the East Indies and on the Asia mainland either captured, destroyed, or out of reach because of Japan's south Pacific conquests and the Axis' positions in the Mediterranean, the flow of imported oil and gasoline to the United States is becoming a trickle. Enemy shelling of refineries as near as the South American coast emphasizes our new self-dependence in the matter of petroleum.

Automobilists would feel the effects of those facts even without a growing horde of mechanized land and sea machines to keep

[*Continued on page* 171]



"Pick-pocket" battleship! That's what the Scharnhorst actually is!



NAZIS BENEFIT FROM INVENTION SPURNED BY U. S.

And a Navy Man Dies of a Broken Heart.

BY WILLIAM FULTON.
(Chicago Tribune Press Service.)
New York, —Nine members of the class of 1910 at Annapolis last week gathered about the grave of one of their classmates, an inventive genius who was snubbed and rebuffed by the United States navy during his lifetime.
Lieutenant Commander Walter Douglas La Mont, retired, whose innovations in boiler plants for warships were snapped up by the German and Japanese navies, died sud
on Jan. 19 and was buried

FULL STEAM FOR AMERICA

An American invention speeds the Nazi Navy—but now America is going to have full steam!

by J. T. McTarnahan

as told to George Daniels

AN AMERICAN Naval Officer invented the boilers that enabled the German battleships *Scharnhorst* and *Gneisenau* to make their sensational escape through the English Channel and outrun the British fleet. Tragically, he had offered all of his inventions to the United States Navy—pleaded again and again, only to be balked by the bureaucratic red tape of the past. That Naval officer, Lieutenant Commander Walter Douglas La Mont, was one of my dearest friends—and he died of a broken heart because neither of us was able to get the recognition for his invention that was so well deserved.

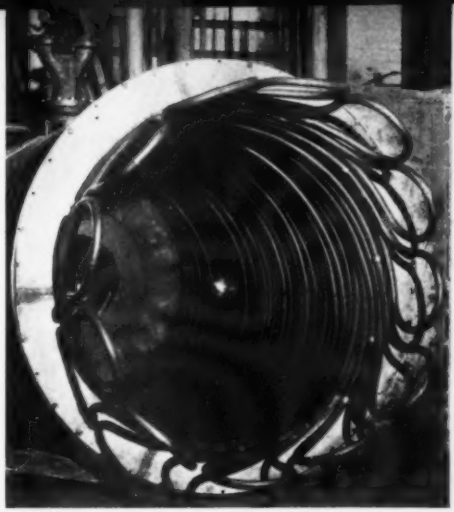
Today in a world madly ablaze with war, the United States surges into the mightiest effort history has ever known, and looks to a dead Annapolis man for speed! And

ABOUT THE AUTHOR

J. T. McTarnahan enlisted in the U. S. Navy in 1899 when he was 15 years old and went to sea on the old training ship, *Adams*. He was transferred to the battleship *Iowa* which was sent to Panama during the revolution of 1901, then proceeded through the Strait of Magellan to the South Atlantic. In 1903, while the U. S. Fleet was assembled under Admiral Dewey, Mr. McTarnahan competed in an all-fleet sports program and won the Lightweight Boxing Championship of the U. S. Navy.

Leaving the Navy, he pioneered in the building of airplanes, and then became one of the earliest designers and builders of oil burners in the country.

Eventually, Mr. McTarnahan joined with Lieutenant Commander W. D. La Mont and together they promoted the La Mont steam boiler system. La Mont and McTarnahan met with every type of resistance and discouragement in offering the new boiler system to the U. S. Navy. Mr. McTarnahan feels that disappointment over the original failure of the U. S. to accept his invention was the principal cause of Lieutenant Commander La Mont's death. Mr. McTarnahan now stands alone in the development of the La Mont system.

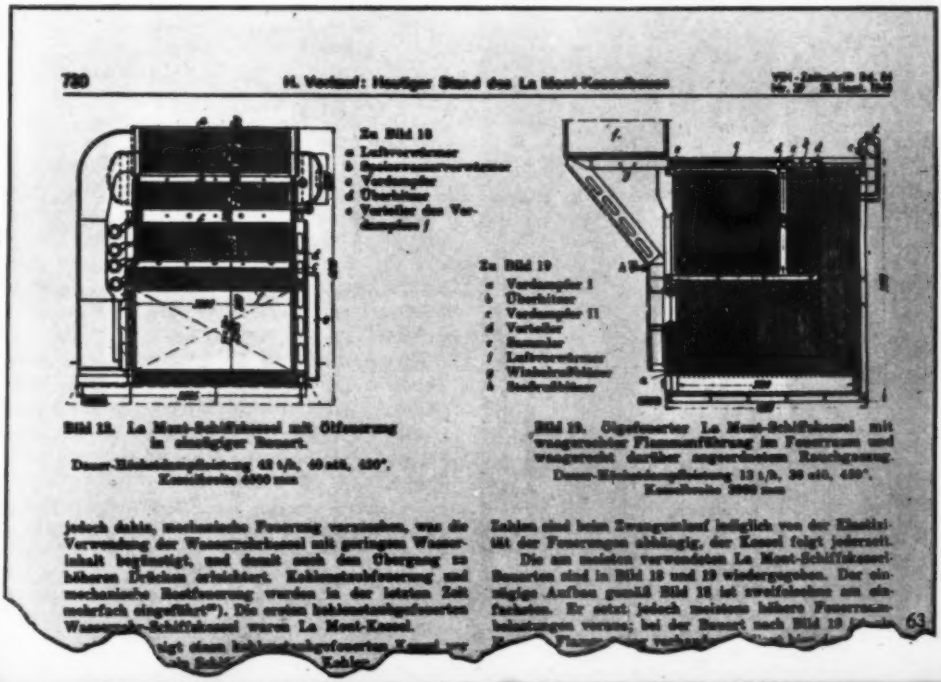


Inside view of the revolutionary La Mont system boiler booster. Units similar to this can be added to practically any conventional boiler to increase efficiency many times. Note small tubes.

America will get the speed from the most amazing boilers ever constructed.

From the start of this war, German battleships have been famed for their incredible speed. The *Bismarck* dared to venture out into the Atlantic, in the face of the British Navy, only because of her edge in speed—and was run down only by an airplane. The

German engineering journal showing La Mont boiler (below).



720 M. Verlauf: Heutiger Stand des La Mont-Kesselbaues

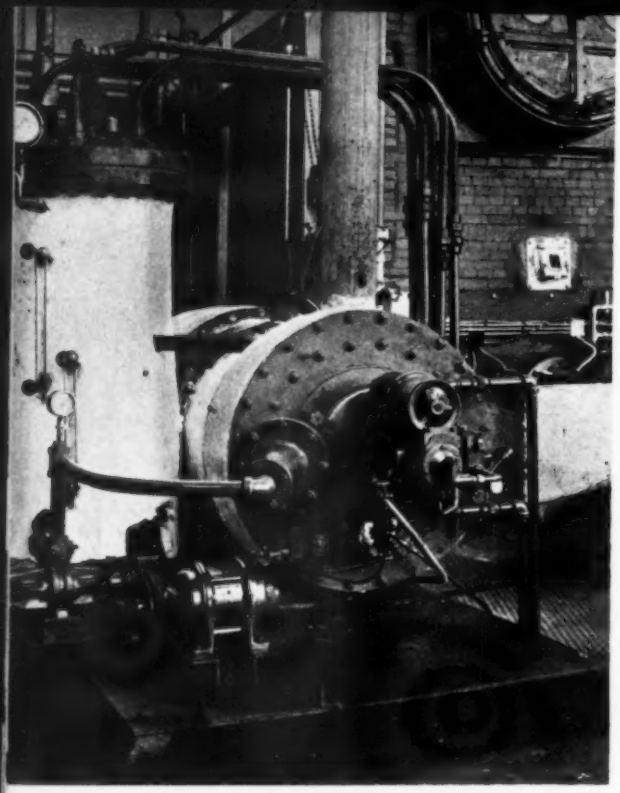
Bild 18. La Mont-Schiffskessel mit Ölfeuerung in einzügiger Bauart.
Dauer-Höchstdampfleistung 42 t/h, 40 ata, 420°.
Kesselhöhe 4900 mm

Bild 19. Gleichartiger La Mont-Schiffskessel mit waagerechter Flammenführung im Feuerraum und waagerecht darüber angeordnetem Rauchgasweg.
Dauer-Höchstdampfleistung 13 t/h, 30 ata, 420°.
Kesselhöhe 3900 mm

jedoch dabin, mechanische Feuerung vorzusehen, was die Verwendung der Wasserrohrkessel mit geringem Wasserinhalt begünstigt, und damit auch den Übergang zu höheren Drücken erleichtert. Kohlenstaubfeuerung und mechanische Rostfeuerung wurden in der letzten Zeit mehrfach eingeführt[*]). Die ersten kohlenstaubgefeuerten Wasserrohr-Schiffskessel waren La Mont-Kessel.

Zahlen sind beim Zwangumlauf lediglich von der Einstellung der Feuerungen abhängig, der Kessel folgt jederzeit.

Die am meisten verwendeten La Mont-Schiffskessel-Bauarten sind in Bild 18 und 19 wiedergegeben. Der einzügige Aufbau gemäß Bild 18 ist zweifellos am einfachsten. Er setzt jedoch meistens höhere Feuerraumbelastungen voraus; bei der Bauart nach Bild 19 [illegible]



Small as boilers, go, one of La Mont's (left) does the work of a standard boiler much larger.

Scharnhorst and *Gneisenau*, although supposedly badly crippled, still were able to outdistance the swiftest British units in making their unbelievable dash through the Straits of Dover.

And the speed of these Nazi naval units is due almost entirely to their revolutionary boiler units, first developed by Lieutenant Commander La Mont.

But now America will get that superiority in speed! No longer can the Nazis sneer at us as did Dr. H. Vorkauf, of Berlin, when he wrote in the *Gazette* of the Union of German Engineers:

"Herpen reported in 1931 in this *Gazette* about the first experiences with La Mont boiler plants in America and Europe. At that time there was a greater number of constructions in America, which were limited to exhaust heat boilers and supplementary installations (water walls). However, the picture has changed completely in the course of the development. In Europe were built many more than one thousand La Mont plants for all uses, with a total steam output of about 12,000 t/h; in America, however, the development came completely to a standstill.

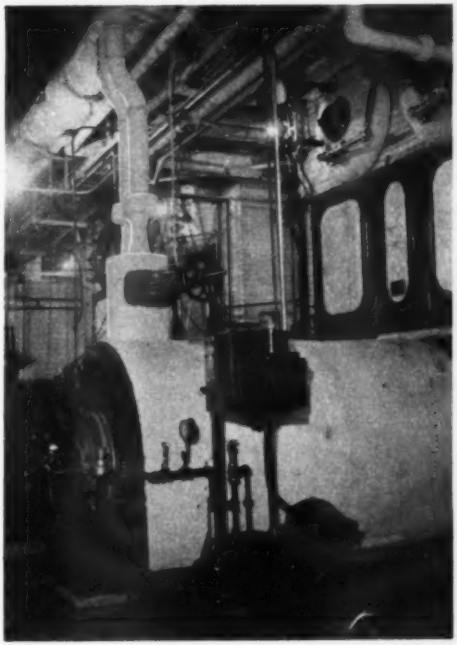
"The reason for this is to be found in that it was recognized in Germany, that the advantages of form possible through compulsory circulation may be utilized to provide a simple, light and cheap boiler. Pioneering work and daring boldness of firms which supported this idea made a practical realization out of this recognition. One can say, therefore, that German force of action and German genius of exploration made the La Mont boiler to that which it now signifies in boiler making."

That is what the *Zeitschrift Des Vereines Deutscher Ingenieure* thought of us in 1940. Doctor Vorkauf will shortly eat his words when he discovers that we Americans can do a better job perfecting our own inventions than he and the whole German Navy.

You may wonder how this invention fell into the hands of the Nazis. Let me tell you

Businessmen shrewdly put La Mont's invention to use while past Navy officials procrastinated. Left, in a New York store.

La Mont boilers on the German battleship **Gneisnau** *aided its dash to safety through the English Channel February 12. (Right) New W. D. La Mont boiler booster was installed here (low cylindrical unit in foreground) with old boiler, and out-performed the previous installation by 300%.*



that it was through no fault of Commander La Mont. La Mont was one of the greatest inventors this Nation has ever known, and like many engineers, unlucky in the business world. When he failed to gain for his invention the place it should have had in the Navy, he sought to prove its worth in a private enterprise. But he was eased out of his own company, and his inventions licensed to Germany despite his protests.

It didn't take the Nazis long to get their stride. La Mont's invention is one of the most amazingly simple devices that has ever changed the course of engineering. The trick lies in what we call "forced recirculation." That simply means that the water is driven rapidly through the tubes of the boiler by a special pump, instead of relying on natural circulation. The result is that a ship that would take 3 hours to get up a full head of steam with an ordinary boiler can do it in 15 minutes with La Mont's! Moreover these boilers, though only half the size and weight of the regular type, can turn out 300 per cent more steam! In a battleship that means not only tremendous speed, but also more armor, heavier guns, and more guns, because weight saved on the powerplant can be added to fighting equipment.

Ten years ago Lieutenant Commander La Mont went to the United States Navy, and offered to hand over every single one of his inventions without asking one penny for them. He wanted to go on experimenting, and that's all he wanted—a little help to do it. He developed a system for converting any old-fashioned boiler to his principle. He watched it astonish steam power experts as it ran up steam output hundreds of per cent beyond anything boilers three times the size possibly could. A tiny box-like unit, it could drive

[*Continued on page* 148]

FLY YOUR

A pilot uses the "U-control" to fly his model on piano wire in the picture above. At left, a remote control pylon, newest wrinkle, is being operated by Lt. T. G. Wallace, U. S. N.

by Bob Ruskauff

A BRAND-NEW quirk in the science of model aircraft building and performance has been sweeping the country. It is, in fact, bringing model aircraftsmanship a long step closer to a holy alliance with its all-important big brother, major aircraft development.

Imagine an airplane pilot who stays on the ground and by means of cleverly manipulating a series of fine, nearly-invisible piano wires, controls a model flying plane which will perform virtually every maneuver of a full-sized ship, even to the releasing of bombs or the laying of smoke screens!

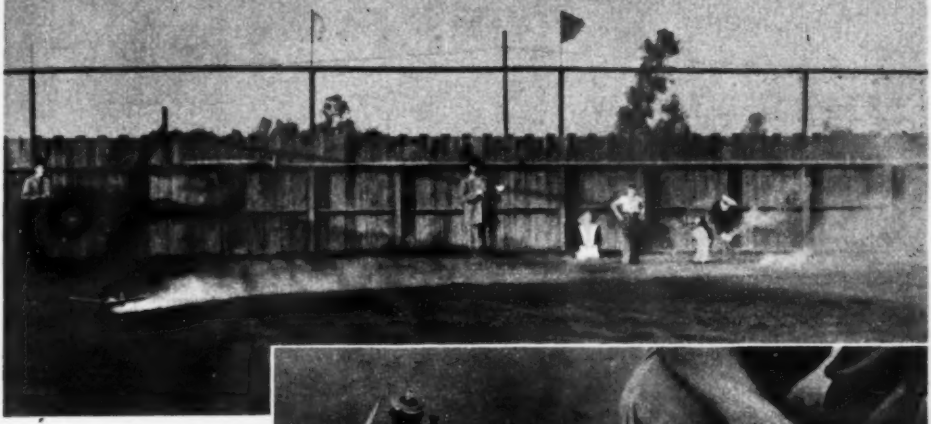
That is just what they do in "U-Control" (or "tethered model") flying.

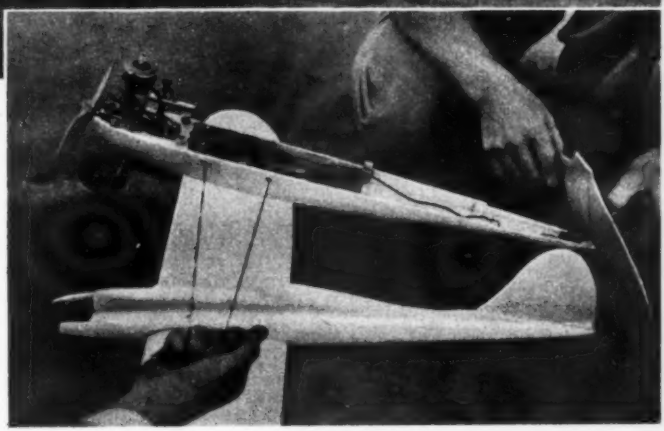
It has already played a part in training of pilots for war. Not long ago U-control models were effectively used at one American training ground to help teach 200 Royal Air Force student fliers the theories of aero-dynamics. They have been extensively used in the training of U. S. Army and Navy air corps pilots.

The whole idea started up in Portland, Oregon, about five years ago, when a veteran model aircraft designer and builder, Jim

MODELS ON A WIRE!

Remote control model flying is the latest wrinkle! Do it with a wire!





Above, remote control model lays a smoke screen as it takes off. At right, closeup shows how control wires reach tail assembly.

MODEL BUILDERS!
Detailed plans for building a tethered-flying model airplane are contained in an article, "Yellow Jacket," to be found on page 108 of this issue. Turn to page 108 for "Yellow Jacket"!

Walker, wondered: "Why not develop a model plane which could be maneuvered from the ground?"

The first attempt was simply a variation of a method used some years previously to demonstrate rubber-driven models in department stores. That is, a line was attached to one wing and shifted fore and aft to achieve longitudinal stability. This was sufficient unto itself when the weather was calm, but in wind it was quite otherwise. It was obvious that some means be found to manipulate the elevators.

The result was U-Control. The aftermath: Walker and his colleagues had soon developed satisfactory model planes which could be controlled from the ground and *were not easily lost or cracked-up, as is the case with free-flying models.* It was also obvious that U-Control would make possible more specific tests of flying ability and more accurate checks on speed and endurance.

The science has been growing apace even in the past few months. A national organization which will probably be indirectly identified with the Academy of Model Aeronautics, is being organized.

U-Control flying started as simply a new wrinkle in the huge hobby of model aircraft building, when Walker started making up

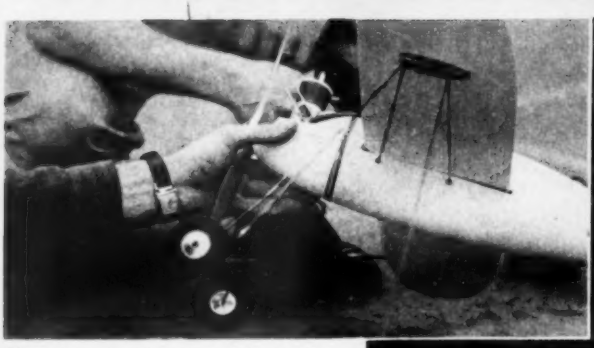


Photo above shows how control wires lead into fuselage under the wing. Right, Dean McMillan demonstrates how "U-Control" is held.

"Build-it-yourself" assembly kits for enthusiasts, and shipping them to various dealers throughout the country.

Walker believes that, conservatively, the number of model plane builders who have adopted the building of tethered flying models in this country is in excess of ten thousand.

In outward appearance, U-Control flying models are identical with all model aircraft. Into each U-Control ship, however, are built flexible control units, to which are fastened piano wire. Primary wires are those attached to the tail assembly to govern the up and down movement of the plane.

Additional wires can be added to cover every other possible maneuver of which any flying ship is capable. Already the more versatile of the sleek, swift little air demons, have performed vertical climbs and dives, Immelmann turns, done hedge hopping, inverted flight, both inside and outside loops. Thus far barrel rolls have not been possible and won't be under the present set-up of mechanism. It remains for some ingenious young experimentalist in the swift-growing army to find a way.

Already one "newest" quirk in the new sport has been introduced by Walker. Although perfected, it has not as yet been popularized. The new device is a remote control pylon, which is stationed outside the circumference of the model plane's flight. Two cables, operated by a flexible "joy stick," reach to the primary wires controlling the plane and, in effect, are operated just as in the regular U-Control model plane piloting.

Actually, the remote control pylon makes the job of watching his own plane in its every maneuver, easier for the U-Control pilot. Without it he is something in the role of a human hub on a wheel.

Control wires for all ships are 52′ 6″ long and are attached to a small "control stick," held in the hand of the "pilot." In controlling motor speed an extra line is added, which leads to the spark control. The two primary wires controlling the elevators are moved by inflection of the wrist. Added control wires, however, are motivated by "plucking" the proper wire with the thumb and forefinger of the unengaged hand, much as one would pluck the strings of a harp.

The number of wires which may lead to the flexible controls in the plane and be effectively used, is largely dependent on the alertness and skill of the pilot.

There is a specific reason for exactness of the wire length. When the pilot stands with arm extended, the plane proscribes its flying arc just 55 feet from the pilot's neck. Allowing for a maximum plane altitude of 16 feet, this gives a true radius of 52½ feet, as

[*Continued on page 158*]

The Real Truth About Rubber

Recapture of Malaya will not bring back our rubber supply. This photo shows how British planters destroyed plantations.

by Willis M. Kimball

Despite Allied loss of vital Far Eastern rubber plantations, we will have enough for war needs.

SO THEY think they have cut off the source of our rubber supply!

It is true they got Malaya. It is true that the sources from which came 97 per cent of America's tires, tubes, accessories and infants' nipples and small boys' slingshots are now in the hands of the enemy or cut off by the operations of war.

But they haven't got our milkweed!

They haven't got our rabbit brush, nor the thousands and thousands of acres of our rich corn and wheat lands.

Nor have they killed the resourcefulness which ultimately will mean more rubber than all their captured jungles can produce.

The American public has become very pessimistic about the whole rubber sit-

Secretary of Commerce Jones holds a guayule bush and tire made of guayule rubber.

A field of guayule in cultivation in California, shown above. It will be made into tires for U. S.

Strange machine at right is a vacuum cleaner which pick seeds from the rows of guayule plants in field.

uation, chiefly due to the fact that, in the excitement of battle and crushing defeats, few people have taken the time to piece all the facts together and look at the whole picture.

Yes, we are going to be rationed. Yes—it will be hard to get tires. Yes—there will be temporary shortages due to technical production problems. But actually, the complete picture is not nearly as bad as the public believes.

Essentially, the facts are these: 1. We have enough of a rubber stock-pile to supply all war needs for about 20 months; 2. In about 18 months, synthetic rubber plants will be producing enough to supply all essential needs. 3. As America's new sources of rubber supply, which we will discuss in this article, come into harvest in a few years, we will be entirely independent of our pre-war sources.

Out in the western wastelands there grow more than 25,000 tons of wild rubber in a solid state available for the plucking. Take the word of Professor T. Harper Goodspeed, botanist at the University of California.

"In the roots and stems of the rabbit brush,"

says the professor, "are imbedded bits and shreds of solid rubber. And the rabbit brush spreads over the wastelands of the West from Southern California to the Northern Rockies." Tons and tons of it.

He has spoken to the federal government about it. What will come of his suggestion is problematical, but we probably won't get around to stripping the great American desert of its rabbit brush just yet—for various reasons.

The rabbit brush is a shrub that grows from two feet to nearly twelve feet high. Sixteen different varieties are to be found on the alkali flats and overgrazed ranges of the West.

Second cousin to the better known guayule, it carries its rubber in the same manner as its Southwestern and Mexican relative, in little shreds and chunks in the fibres of its branches and roots.

While there have been claims advanced that the present wild stand of rabbit brush could produce under process anywhere from 10,000 to 250,000 tons of rubber, it has never been claimed that the "bunny rubber" extracted could compete in a commercial market with the product of the Para and India rubber plants.

U. S. rubber, above, and desert rabbit brush, are other sources of rubber for us. Dr. Goodspeed, California scientist, is shown at right.

It would cost, said Professor Goodspeed, about 45 cents a pound for the crude product against the 20 to 25 cents for crude rubber from the Far East. But even at that rate, the bunny rubber would be somewhat cheaper than the cost of synthetic rubber at its present scale of production.

Is this an idle dream of a college professor? Let's look and see.

Guayule (the Mexican relative — pronounced "hwa-yu-leh") grows in vast expanses south—and north—of the border. A bill in Congress proposes the planting and cultivation of some 45,000 acres of guayule,

A field of guayule in cultivation in California, shown above. It will be made into tires for U. S.

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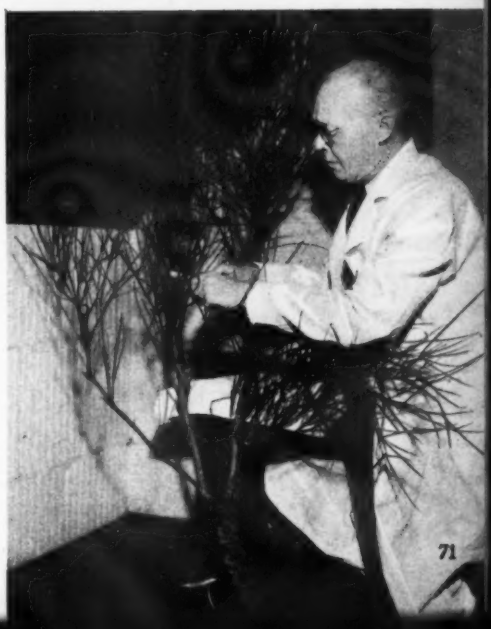

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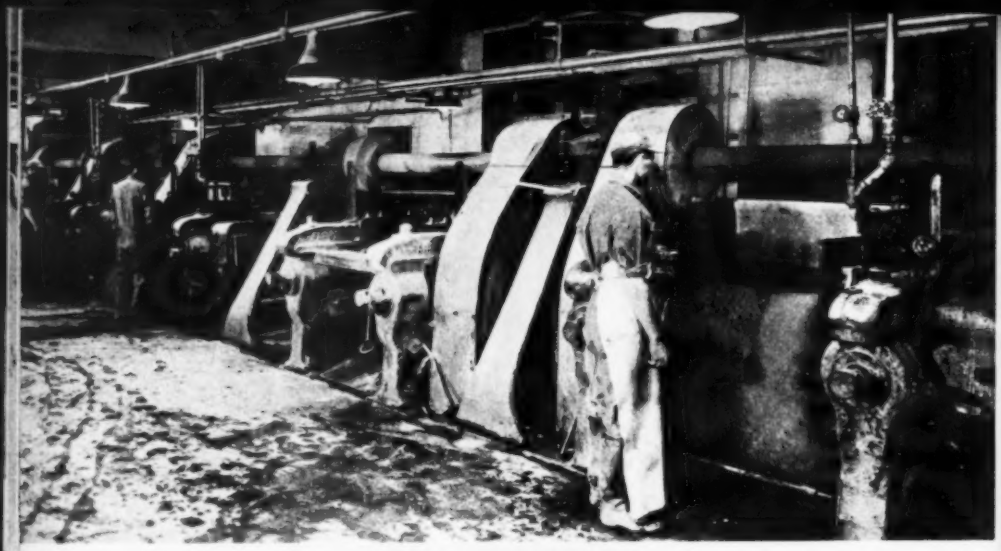
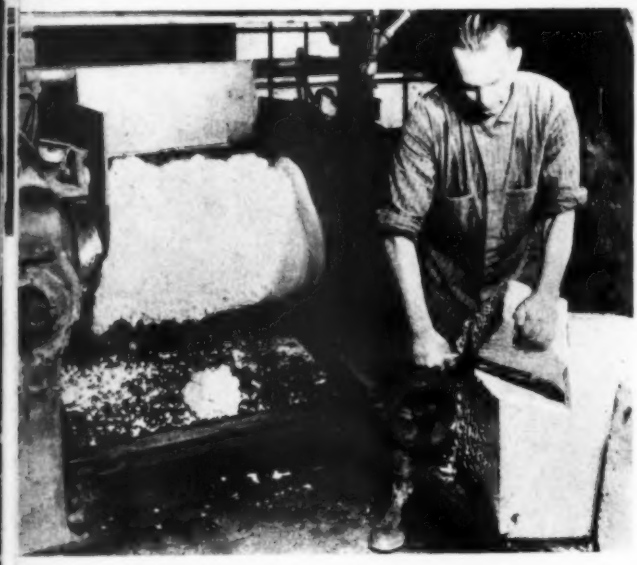




While new sources of natural rubber are being developed, we must rely on synthetic rubber, shown in production in these pictures. This is "Ameripol," made of oil, soap, natural gas.

solely for the purpose of bolstering our stockpiles of crude rubber.

J. J. Newman, vice-president of the B. F. Goodrich Company, speaking recently in Boston, told his audience that guayule produces a rubber not equivalent in rubber content to plantation rubber. It takes a hundred tons of guayule to produce the same rubber content that 75 or 80 tons of plantation rubber will produce. But—

"Our company," he added, "has been the leader in the development and use of rubber from this source. We have been using it for 30 years. Last year we consumed about 50 per cent of all this guayule grown or imported in this country."

Industry already uses the cousin of the rabbit brush!

One bar to the intensive use of guayule—and it applies to the rabbit brush as well—is that it takes four years or more to raise a crop to harvest. And because a large part of the rubber content is in the roots, it is necessary to pull and use the entire plant, whereas the rubber tree can be tapped year after year.

Professor Goodspeed had a practical twist to his suggestion. He proposed pulling the existing stand of rabbit brush, using it for a quick supply of rubber and then reseeding the wastelands to desert grasses, creating new ranges for meat- and leather- producing cattle.

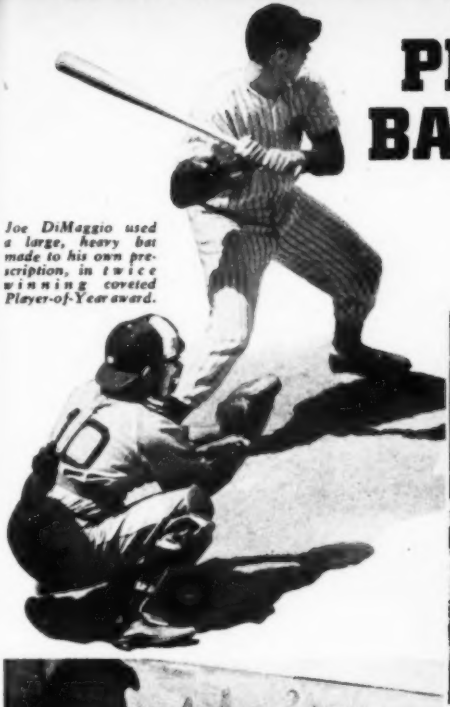
Years ago, Thomas A. Edison had an idea about rubber, too. It was in the days when the commerce-hungry nations were battling over the control of rubber sources—the days when it was becoming evident that rubber and automotive power were about to change our economy.

Edison discovered rubber in milkweed! The writers of the day envisioned vast acres of the stick-like weed under cultivation, another new industry growing under the wizard's magic touch.

[*Continued on page* 173]

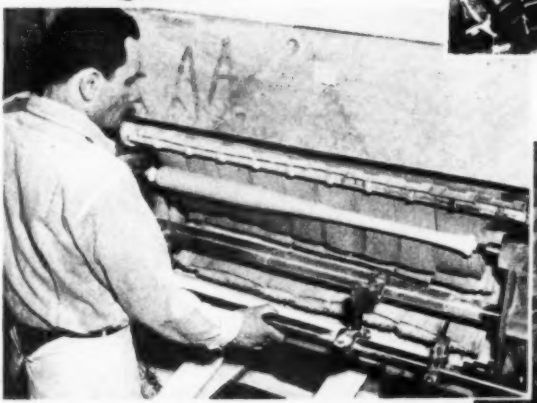
PRESCRIPTION BASEBALL BATS

Professional players rely on bats made to their own data for consistent batting averages.



Joe DiMaggio used a large, heavy bat made to his own prescription, in twice winning coveted Player-of-Year award.

Overlapping knives will soon turn the blank ash billet into a rough bat. Craftsman Joseph Kren inspects adjustments in his 40-year-old bat factory.



Rectangular sandpaper pads, power-operated, will smooth the bat in one long, slow revolution. Then paste filler, light or dark stain, as ordered, and lacquer or shellac will be applied.

Polishing is the final operation before the nibs are cut off; left, unpolished bats wait attention; right, part of 100,000 made yearly. Prescription bats are all hand-made, however.

by B. J. Ryan

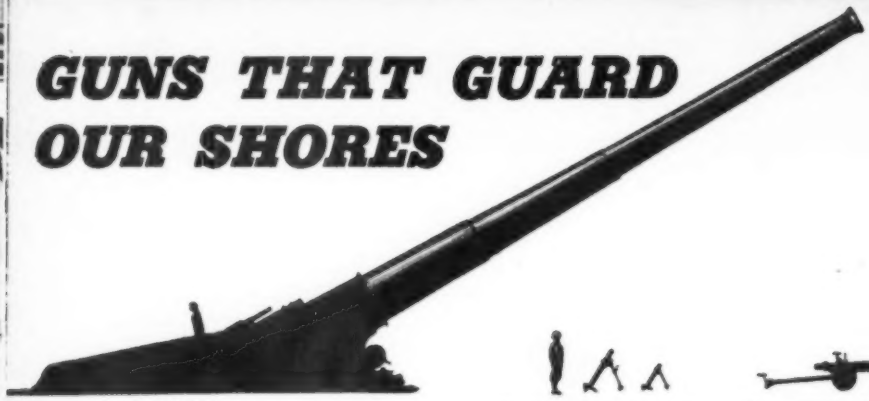
WHAT a rifle is to a hunter and a scalpel to a surgeon, a bat is to a major-league baseball player: an essential tool in making his living.

No wonder, then, that he's fussy about the wood and workmanship going into this important aid to maintaining a top position in his pleasant and lucrative profession.

In fact, leaders in batting like Joe DiMaggio, Hank Greenberg, Babe Ruth, and their fellows, past and present, have been fussy to the point of filing actual prescriptions for the bats they want from, for example, Joseph Kren. Nearly 50 years ago he founded and

[*Continued on page 177*]

GUNS THAT GUARD OUR SHORES



16-inch gun.

81- and 60-millimeter mortars. 37-millimeter anti-tank gun.

37 mm. anti-aircraft.

75 mm. howitzer.

75 mm. gun.

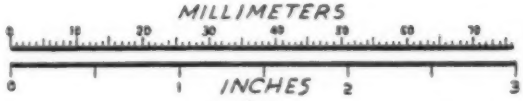
105 mm. howitzer. 155 mm. howitzer.

90 mm. anti-aircraft.

12-inch mortar.

240 mm. howitzer.

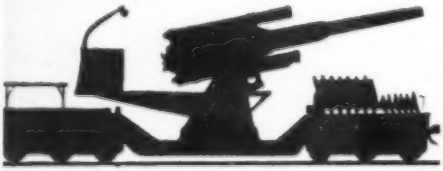
3-inch anti-aircraft.

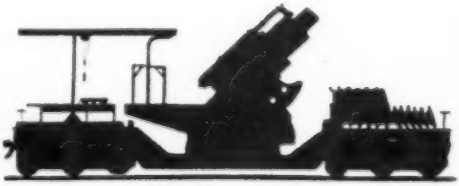


155 mm. gun. 8-inch howitzer.

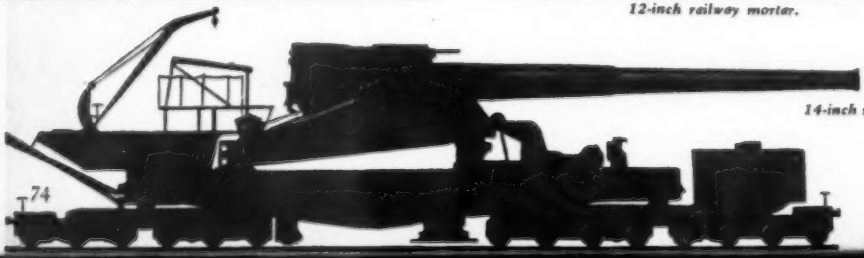
Drawn to accurate scale, silhouettes on this page show comparative sizes of principal U. S. guns. Scale above shows the relationship between "millimeters" and "inches" in measuring the diameter of the bore of a gun. One inch approximates 25 millimeters.

8-inch railway gun.





12-inch railway mortar.



14-inch railway gun.

16-inch coast defense guns will throw a 2,300-pound shell up to 28 miles, costs $50,000 to make and costs $2,500 to fire.

ON FOUR pages, we present here the principal types of guns that are now guarding the shores of America against invaders. From the tiny 60-millimeter mortar to the giant 16-inch coastal rifle, these guns are shown in picture and diagram. On the opposite page you will find a scale relating "inches" and "millimeters."

105 mm. field gun is improvement on the old "French 75's." It shoots a 33-pound shell up to 6 miles, 4 shots a minute.

New automatic 37 mm. anti-aircraft gun, with practice formation of crew. (Battle formation is different.) 1. Vertical gun pointer, who does actual firing. 2. Lateral pointer. 3 & 4. Loaders. 5. Ammunition relayers. 6. Ammunition chauffeur. 7. Gun commander. Additional crew is not shown in this photo.

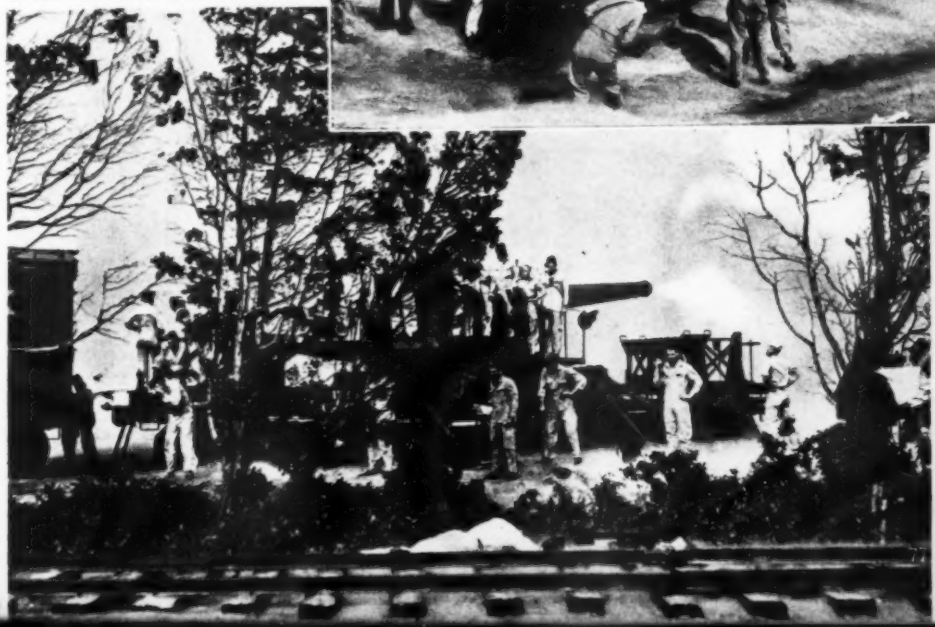
Mobile 3-inch anti-aircraft guns in action. New 4.5-inch and 90 mm. anti-aircraft guns are now in production.

Giant 240 mm. portable howitzer, shown above, is the largest fully mobile gun ever built. It is being towed by truck.

6-inch coast defense gun is shown being fired in the photograph below. This gun is one of the mainstays of our defense.

155 mm. Coast Guard Artillery rifles (above), throw a 95-pound projectile about 10 miles. It is extremely mobile.

8-inch railway-mounted gun below was especially posed by military authorities so that tree would cover up secrets.



You're RIGHT — That's WRONG

Here are 25 statements, some of them true, the others false. The trick is to separate the *true* statements from the *false* ones—and it isn't as easy as it looks! Use a pen or pencil and check the correct box under each statement and see how you make out! After you've given yourself the test, try it out on friends and other members of the family and compare scores. They'll enjoy it and so will you.

Are you ready? Let's go!

1. The Haversian canals join the three major tin producing centers of South America, and are used for freight transportation.
   True ☐ False ☐

2. The wake-robin is not a bird used by primitive peoples instead of an alarm clock, but a plant.
   True ☐ False ☐

3. Kitchen middens are heavy rubber gloves used by European housewives when preparing dishes containing garlic.
   True ☐ False ☐

4. Although brass is extremely important in defense production, there are no brass mines in the United States or England.
   True ☐ False ☐

5. The slop chest on a ship is the bin in which garbage is stored to be used as ballast.
   True ☐ False ☐

6. The blimp gets its name from its inventor Jacob Tookle Blimp, Dutch aircraft designer and grower of the Tookle Tulip.
   True ☐ False ☐

7. Histology is the study of the history of speech and the origin of languages.
   True ☐ False ☐

8. Butter being eaten today in Japan is made from the oil in peanuts, cottonseed, soybeans, fish, and whales.
   True ☐ False ☐

9. Although women are frequently referred to as the weaker sex, they are much less liable to bomb shock than men.
   True ☐ False ☐

10. Water was first piped into houses in England more than three hundred years ago.
    True ☐ False ☐

11. Candy stores of Europe lacked two of today's most popular flavors until the New World was discovered, both chocolate and vanilla having come from America.
    True ☐ False ☐

12. Snow on mountain tops is often years old and rock-hard.
    True ☐ False ☐

13. Sea horses make faint snapping noises which seem to be a means of communication.
    True ☐ False ☐

14. Army parachutes are retired from service after seven years, long before the men who use them.
    True ☐ False ☐

15. The hares hunted by the Mongols were scared stiff by a whistling arrow shot over their heads, then shot dead with a second arrow.
    True ☐ False ☐

16. The differential of an automobile is the mechanism that makes it possible to shift gears from one speed to another.
    True ☐ False ☐

17. The tips of an airplane propeller usually travel much faster than the plane itself.
    True ☐ False ☐

18. Many American airplanes can dive faster than their pilots could fall, even if they jumped out without parachutes.
    True ☐ False ☐

19. Pigs and beef cows would be bad drinking companions for hens as the hens drink twice as much for their weight.
    True ☐ False ☐

20. Sperm oil is used as lubricant in breaking in motors.
    True ☐ False ☐

21. Grain alcohol is so named because of the grain in the wood from which it is made.
    True ☐ False ☐

22. The colors of the French tricolor flag are not the same width because if they were the same width they wouldn't look the same width.
    True ☐ False ☐

23. The Swordfish torpedo planes which have been used in the current war by the RAF, are biplanes.
    True ☐ False ☐

24. The steam turbine must turn at very low speed in order to be efficient in operation.
    True ☐ False ☐

25. The Link trainer was originally devised for the purpose of training the missing link when and if found, hence the name.
    True ☐ False ☐

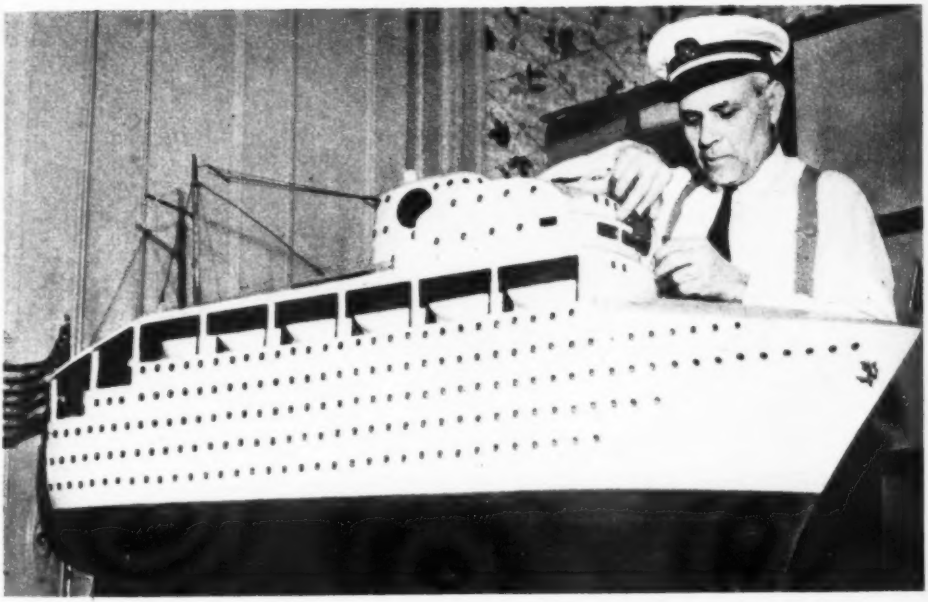
WHAT'S YOUR SCORE?

To get your score simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70, fair; and below 60—well, try again next month!

Answers will be found on page 164

NEWS OF SCIENCE AND MECHANICS

NEW "UNSINKABLE" SHIP — NEW WATER LOCATER — INDOOR 'CHUTIST — GIRL SUB



Seaman Designs "Unsinkable" Ship

TWELVE separate, air-tight chambers in the hull, and motors set low to prevent capsizing, would result in an "unsinkable" ship, according to the designer, Domenic Serio, retired seaman shown above with a model of his revolutionary-design vessel.

Snow-'n'-Mud Buggy Uses Discarded Airplane Tires

THE mail must go through on rural delivery routes, come high snow or deep mud, so Perkins Battles of Randolph, Vt., equipped his light coupe with used airplane tires. He'd noted that trucks with big tires easily negotiated going that was difficult for his mail car. The transport plane tires have a cross section width of 17 inches, and fit on a 16-inch wheel.

Nurse Devises New Sling

A NEW arm sling shaped like a hammock and crocheted in wide meshes from cotton yarn has been worked out by an English nurse, Miss Marjorie Bate, a member of St. John ambulance, for possible use by Britain's armed forces. Shaped like a hammock, it's said to give greater support to an injured arm, does away with knots and pins, and takes weight off the neck.

Throw On A Cube Of Coal!

CUBE coal is now being manufactured from "slack," the waste product of coal, then neatly wrapped for clean handling at home. Since slack, which is mixed with cornstarch and processed into the cubes, is a waste material not suited to industrial heating, the new product conserves supplies needed for war industries. Credited with more heat per dollar, cube coal is 7x11x3½ inches.

Target Advances Toward Marksman

ONLY one of its kind in the country, the pistol range at the Palmetto Pistol Club at Miami, Fla., provides marksmen with an unusually good idea of how it feels to be firing at an advancing enemy gunman. The moving targets, shown at left as they appear to the pistol wielders, are mounted on a two-and-a-half-ton crane which moves on four light gauge tracks and is controlled from behind the firing line. The U. S. Marine Corps may install copies.

Cigar Holder For Blackouts

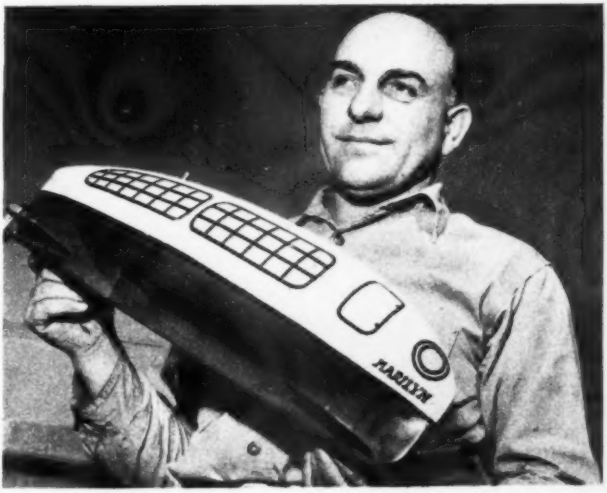
THE war brought a problem to habitual cigar smokers who want to keep on smoking but know the glow of the ash may reveal their location to enemy spotters. Frank Locey, Hawaii's Director of Civilian Defense, dreamed up an answer to his own satisfaction: it's a blackout cigar holder made of bakelite and lined with copper. It completely hides the cigar and its tip's glow.

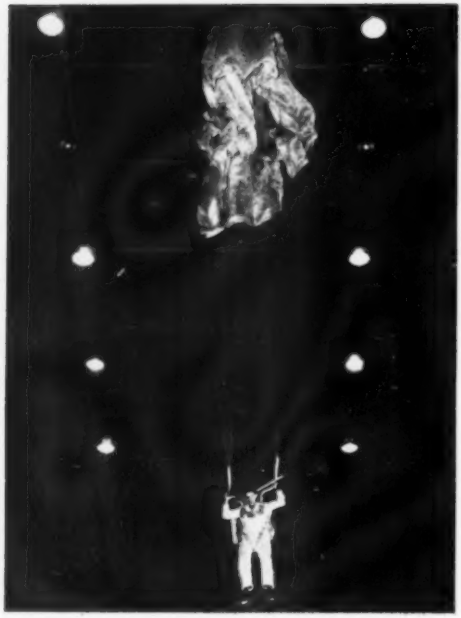
Beat The Electric Brain?

THE ancient game of Nim, familiar to young and old for many years, turns up in a new guise in this elaborate electrical giant of a machine which its builders, Westinghouse Research Laboratories, call the Nimatron. Playing the Nimatron, with its forbidding number of tiny lights, and five-button playing surface, is a prospect to frighten even a pinball machine addict. It's possible to win, though!

Nonsinkable Lifeboat To Escape Suction

LIFEBOATS launched and loaded during the final minutes a sinking ship is afloat, are often victims of whirlpool suction created as the vessel plunges to the bottom, Herman E. Bakenhus of Azusa, Calif., discovered—and so designed a "mechanical fish," or nonsinkable lifeboat, which will escape such a fate. The boat, resembling a submarine, is equipped with telescopic fins, fore and aft, to keep the craft upright even if temporarily submerged.





'Chutes 63 Ft. Indoors

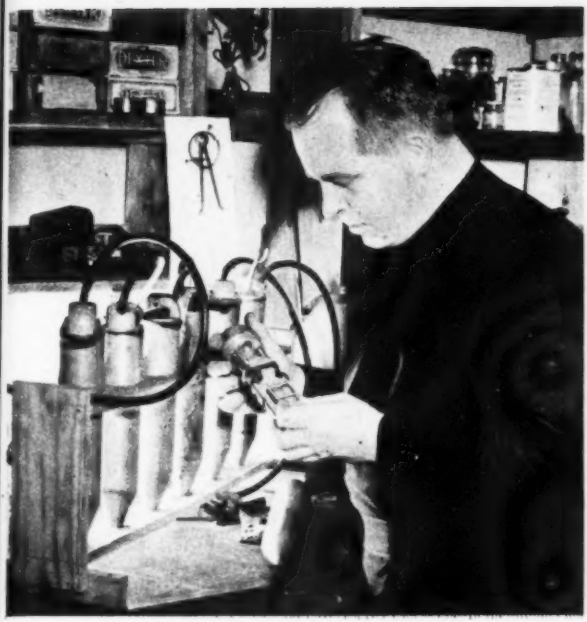
WHAT is termed the world's shortest parachute jump was made at the Int'l. Amphitheater in Chicago recently. With a regular parachute unpacked, Carl Rupert dropped from an inside roof girder 63 feet to the floor. Photo shows Rupert as he neared the hard floor with the opened parachute about to spread and check his fall.

Goggles Make Girl A Sub

THE periscope goggle, which permits the wearer to breathe below the surface, is here displayed by Susan Scott at Miami where they are called the latest in underwater goggles. Really more a mask than eye wear, the goggles admit air to the swimmer by means of the gadget at the top. The mask is held against the face by a head band.

Home Building Sped By Cellar-Digger

A BASEMENT 27x30x4½ feet in dimensions was excavated in the record time of 3½ hours in Denver, Colo., recently when a mobiloader-equipped tractor was assigned to the job to speed up a defense building project. The tractor previously had been working as a track-layer but was adapted to excavating duty with a 74-inch bucket-shovel. Four hours after it started, forms were completed and concrete being poured.



Sound Waves Of Man-Made Earthquakes Find Water

NEW apparatus that goes the divining rod one better in locating underwater springs and near-surface spots of the water table is the credit claimed for a truck-borne field unit devised by the Rev. Daniel J. Linehan, S. J., seismologist of Weston, Mass. In the large photo Father Linehan is shown with a group of small seismographs which are sunk in the ground and used to detect and evaluate earthquake-like sound waves transmitted underground from the site of experimental explosions some distance away. In photo at right he is setting off a dynamite blast and putting in motion a photographic recorder, mounted in the truck, which makes a sort of X-ray picture of geological conditions.

Fire-Bomb-Proof Chemical Invented

CLOTHING, wood, and items ordinarily quickly inflammable like net curtains are rendered impervious to incendiary bombs by a new chemical compound, deoxolin, shown here being demonstrated by its originator, Dr. O. T. Hodenfield, to naval officials. Ordinary curtain at right quickly flamed when the torch was applied but its mate, treated with deoxolin, did not. (Note to housewives: it can be washed out after the war.)

First Female Test Pilot

AMERICA'S first woman to test planes is Alma Heflin, 28, a Winona, Mo., girl whose career in aviation has been spectacularly brisk. In 1934 she had only 100 hours of flying time, but by 1940 she had been a parachutist, a flying- and ground-school instructor, a mechanic, a navigator, and an aircraft engineer. Now she has a truly unique job, as first and only United States woman to give planes perilous, pre-delivery workouts.

Girl Lifeguards on Duty

GIRL auxiliaries are giving glamour to the life-saving corps at the Venice, Calif., beach. The girls are equipped with scooters carrying paddleboards, stretchers, inhalators, ropes, and lifebuoys, in an effort to make rescue as pleasant as possible for half-drowned swimmers. Part of the group is shown above during a test, moving a "victim" to a hospital in their special, scooter-powered mono-ambulance.

Tandem Bike-Taxis Replacing Autos

WITH all the gasoline in Nazi Europe being diverted to the Reich's military demands, use of gasoline-engine modes of transportation have been practically eliminated. (See article on page 61 of this issue.) Notice that no motor-traffic is visible in this scene on the once-swank Riviera, where substitutes for taxis include this unusual tandem bicycle drawing a trailer termed a "sedan." Ah, for the good old days of automobiles!

Largest Transport Built

THE world's largest twin-engined plane, this new giant Curtiss Condor, or C-46, has an 108-ft. wing span, weighs 25 tons. Designed as a 36-passenger "luxury airliner," it now carries many more than 36 infantrymen, or light artillery and one or more peeps or reconnaissance cars, having been exhaustively tested by the army air forces and chosen as basic design for troop transport planes. Right, inspectors are checking the upper forward section of the fuselage, train tunnel-like in size. Above is one of the sky giants in England, to which it was flown in only 9 hours and 40 minutes for operation by British Overseas Airways.

Directing "Gassed" Traffic

LONDON policemen doff their familiar "bobby" headgear to put on military-looking helmets during anti-gas demonstrations in the city's Helborn district. They direct traffic by means of a battery-operated amplifier which can be set up wherever congestion of pedestrians and vehicles requires, in order to clear an affected locality quickly. The masks are so constructed that speech is audible through the special filter at the front of the gas masks, and can be directed into the microphone for amplification. If the business they're about wasn't so grim, they might almost be mistaken for a couple of radio broadcasters working up a "sidewalk interview"!

Planes Repaired In Mobile Shop

AIRPLANE engines are overhauled and other necessary repairs made at remote bases with the use of this tent-like, mobile machine shop that has become part of the United States Air Corps' present-day equipment. Although thin and flimsy-looking, the mobile shop fits snugly around the wings (note shaping of fabric) and fuselage to keep out wind and cold.

New Panama Road Cut Through Jungle

THIS broad swath was cut through the jungles of the Isthmus of Panama by United States Army Engineering Corps for seven miles in only 14 days—record-breaking time even in the states! Army bantams and command cars jog along the soft and twisting trail which completes a new 48-mile trans-Isthmian highway connecting by land the ocean terminals of the Panama Canal. Soon it'll be paved.

Joltless Vehicle Carries Munitions

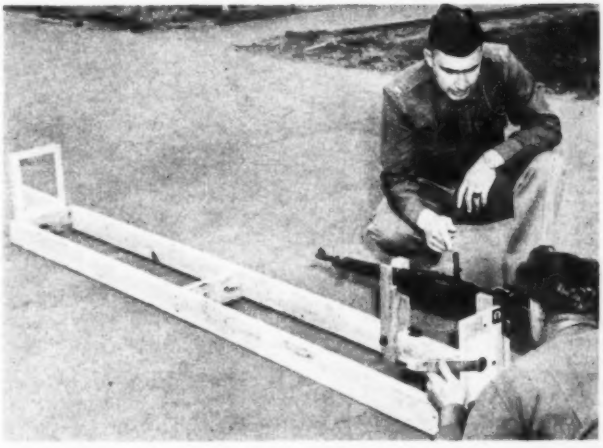
TO ELIMINATE some of the hazards in moving explosives at arsenals and powder depots, a speedy motorized vehicle which rolls on rubber tires on the highway or railroad track has been developed for government use. Called the "auto-railer," it uses special rubber tires which work in conjunction with conventional flanged guide wheels for operation on railroad tracks. It is spark-proofed, has exterior wiring.

Cadets Learn Blind Flying in the NJ-1

CADETS at Corry Field, part of the naval air training base at Pensacola, Fla., learn practical blind flying, first with an instructor and then alone, in the NJ-1, shown at right and in color on the cover of this issue. This basic trainer of the Navy is the final transition stage before the cadet goes to the advanced type of ship which has higher power and mounts armament.

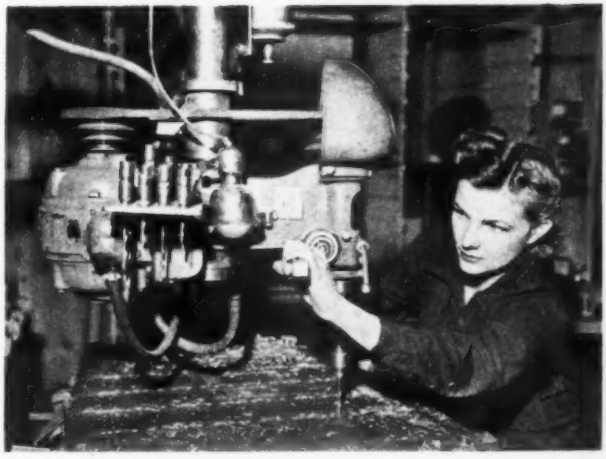
Makeshift Device Aids Rifle Sighting

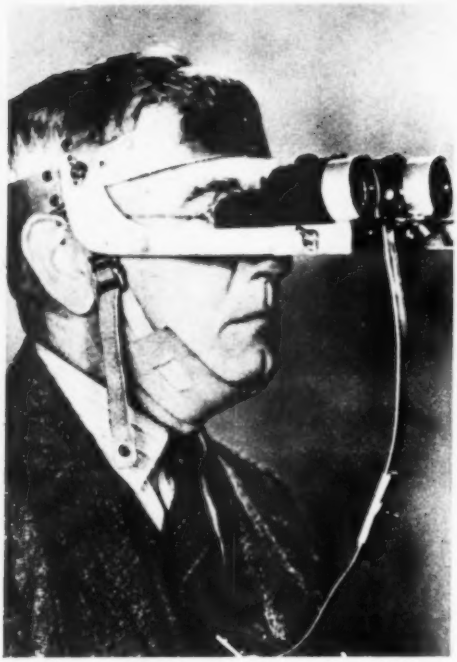
TO FILL a long-felt need—a method of instruction in sighting a rifle to replace the "rule of thumb" system—Lieut. M. W. Hammond, kneeling, built a successful device from odds and ends of lumber and metal. In the mirror at the end of the wood frame is reflected both the muzzle of the gun and a small target on the wooden block before the student. The soldier follows the reflection.



Pearl Harbor Widow Works at Power Drill

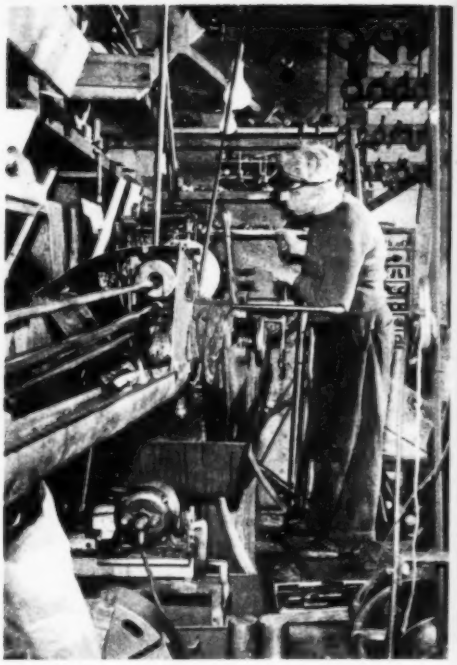
WIDOWS of Navy victims of the Pearl Harbor attack are taking up the fight where their husbands left off. Through the Navy Relief Society and Navy officials, many of them, like Mrs. Fern Evans at right, have been given a chance to qualify for aircraft factory jobs to provide their children and themselves with a livelihood and also to make a direct contribution to the nation's military strength that will avenge Pearl Harbor.





Handless Binoculars

HEADGEAR which makes it unnecessary to use hands with field glasses will be of considerable help in warfare, experts say. Officer using the binoculars will be able to make notes on observations, handle a gun, or otherwise use his hands more advantageously than merely to support the glasses.



One-Man Defense Plant

WAR production has brought a flood of work to small industries and plants which sometimes were overlooked in recent years. The new trend is emphasized by this one-man machine shop operated by Ames McCain of Seattle, Wash., who handles subcontracts for the Boeing Airplane Company.

"Kicker" Powers Collapsible Boat

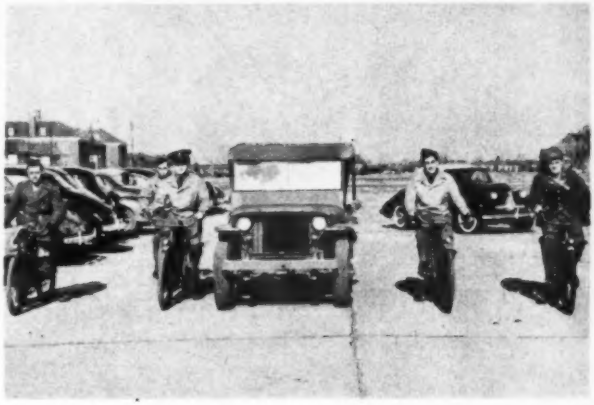
POWER is part of the equipment of the U. S. Navy's collapsible rubber boats, 10 h.p. outboard motors now being attached to a mounting to drive the shallow craft more rapidly toward rescue. Made of woven duck fabric coated with synthetic rubber, the boats can be folded into suitcase-like containers. They are equipped with cylinders of carbon-dioxide gas which will inflate a boat in less than 12 seconds.

Two-Stretcher Carrier For Truck-Ambulances

THIS collapsible two-stretcher cradle was designed to aid quick conversion of the nation's lightweight delivery trucks and station wagons into a fleet of half a million ambulances. Weighing only 75 pounds and ruggedly constructed of wood and strap steel so that priority rules will not handicap making them, the carrier can be folded compactly when not in use, yet set up in less than a minute. The upper stretcher rests on tracks which let down on hinges.

Bikes Take Place In Army Beside Jeeps

CIVILIANS are not alone in taking to bicycles now that manufacture of motor vehicles and tires has been banned for non - military uses. Bikes painted olive drab have been assigned men at Mitchell Field, Army Air Corps headquarters on Long Island, so that they can get around the grounds quickly, easily—and economically. The "wheels" are taking a position right up next the jeep in our army!



Assault Boat Carries Band Afloat Or Ashore

EVEN though a parade at Camp Blanding, Fla., took place on dry land, army assault boats had a prominent place in the procession. Pulled by a truck, this pontoon boat, which is also used in building bridges across streams during advances, served a double purpose by accommodating army bandsmen of the 31st Division who supplied martial music for the parade. Normally, in transporting the boats, two or three are stacked.

Air Marines Take To Bikes!

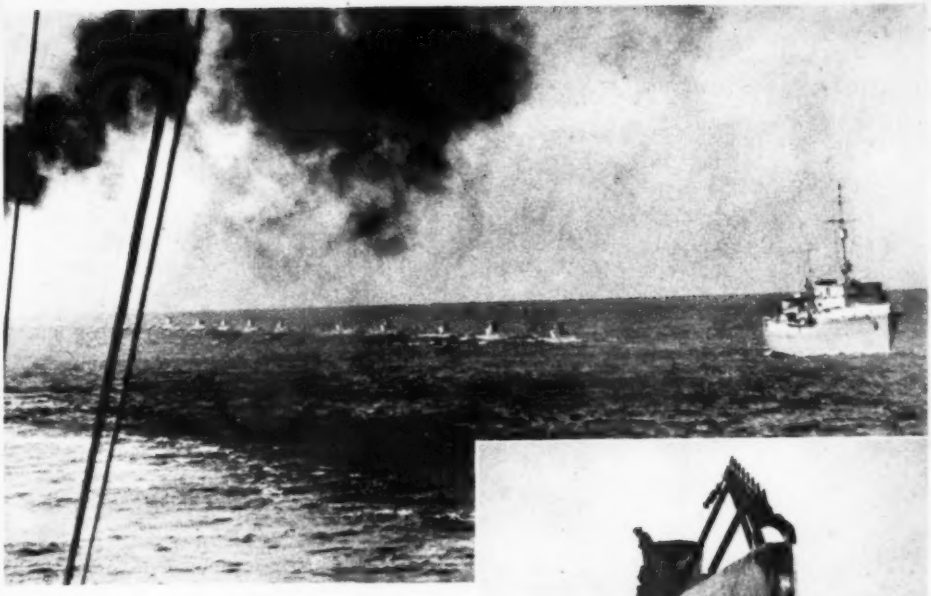
BUILDING a parachute troop is one of the latest functions of the United States Marines, who are experimentally adding new mobility to the division by equipping squadrons with bicycles, somewhat as paratroops in northern climates now are dropped skis. After descending from a big transport plane, a leatherneck like the one above assembles a sectional bicycle separately dropped, then prepares to ride away with a deadly tommy gun to spread destruction behind enemy lines.

Louder Than Joshua's?

SEATTLE, WASH., residents feel that this huge air-raid siren may be a satisfactory answer to the problem of warning citizens of large cities of an impending air raid. Three of these sirens, it is figured, will adequately inform the 450,000 residents of Seattle of a raid, making their strength comparable to Joshua's horn which blew down Jericho's walls. June Day shudders while Professor Frederick K. Kirsten of the University of Washington, the inventor, does a Joshua.

Seaplane Trainer Used In East Indies

NEWEST seaplane primary military trainer is this Ryan ST3-S, recently developed by the Ryan Aeronautical Company and shown here at San Diego, Calif. Earlier models of similar seaplane trainers were used extensively in Java to train pilots for the Dutch East Indies Navy. With much of the U. S. air attack and defense taking place in the Pacific area, seaplanes are of prime importance.

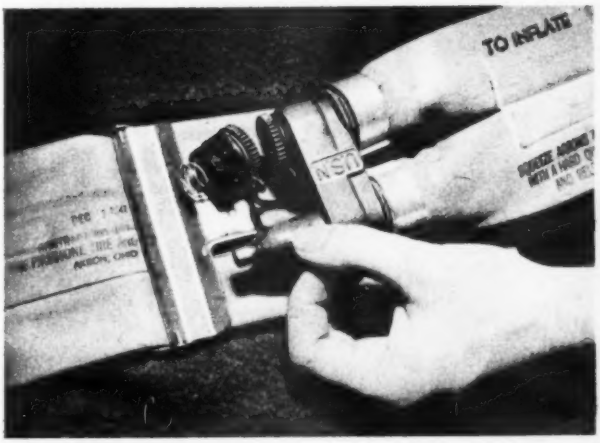


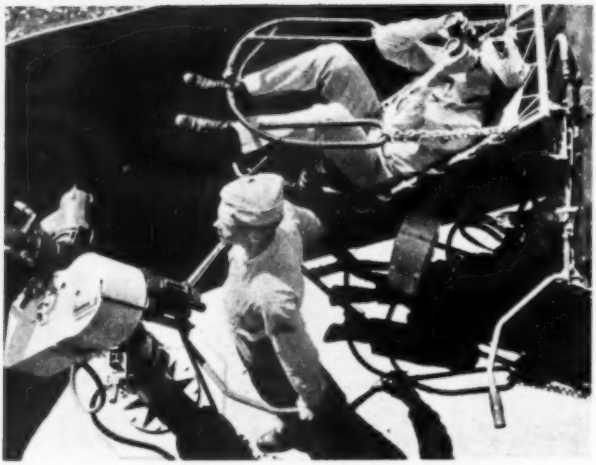
Mothership with U-boat Brood

HEAVY toll of merchant ships, victims of Nazi U-boat warfare, is due to wolf-packs of submarines like those shown above trailing a mothership while being reviewed. The wolf-mothership, or supply-base, is a greater prize in defensive action against Germany than the submarines. At right is shown the row of sawteeth atop the bow of one of the U-boats in the pack above. The teeth are designed to cut underwater nets that might befoul the vessel fatally.

Soda Water Makers Inflate Lifebelts

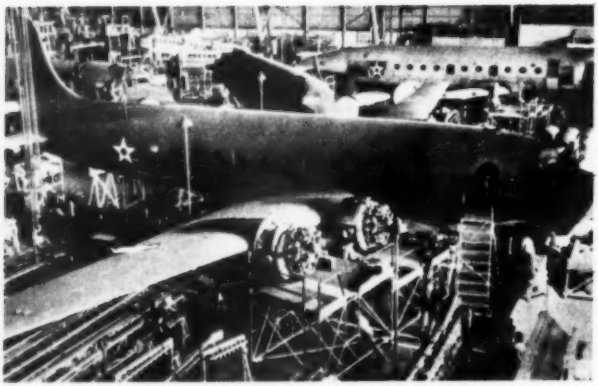
COMPRESSED air tablets of the same type used to charge soda water for a highball are, used in inflating the new-type lifebelts which were part of the equipment of the United States Army troops crossing the Atlantic for duty in Ireland. Here one cartridge is installed and another shown about to be put in. If the emergency charge of air leaks out, the belt can be blown up with lungs. Squeezing a cylinder releases the gas.





Spotting Planes Of Prey From Our Ships

THE sky and its possible enemy planes are brought closer to United States anti-aircraft guns on ships of the Pacific fleet with special and elaborate equipment like this to spot preying aircraft. The tilting seat is a lookout chair arranged to provide comfort for the spotter so that his sky-gazing efficiency will not be impaired. The man at left is stationed at a machine-gun with handlebars, cycle-like; and another is at right.



Mammoth New Army Transport Built

FIRST picture released of the United States Army's mammoth new transport planes, this photograph reveals one as construction was being completed in the Douglas Aircraft plant at Santa Monica, Calif. This factory view emphasizes the enormous fuselage and wingspread. It was originally designed for commercial service, but adapted to army use.

Synchronized "Crab" Charts Cadet Flight

THROUGH magic synchronization, an electric indicator—termed "crab" because of the crustacean-like way it moves about the table surface—records the "flight" of an air cadet in one of the famed, hooded Link trainers in the background. As the Kelly Field advanced aviation trainee works controls that feel and respond like those of a real airplane, the "crab" charts his flight on the control table and unerringly tells the instructor and his aides whether the pupil is "flying" well or poorly.

CRAFTS AND HOBBIES

PHOTOGRAPHY
MODELS • RADIO
THE WORKSHOP
BOATS • BIKES

Above: *"The Draftee," a multiple portrait made by exposing the subject twice against a black background. Below: The second image made to blend with the first as described in text.*

"MULTIPLE" PORTRAITURE

by Louis Hochman

PORTRAIT photography is interesting in that it offers a means of portraying people as they are, and for that reason, it has probably the largest following of amateur enthusiasts of any other specialized field of photography.

Interesting as portraiture may be, however, it can be made even more interesting and, in many cases, more expressive by employing a few simple tricks to produce several portraits of the same person on a single film.

The trick behind making multiple portraits is the use of a black background, which permits the film to remain unaffected in those portions where no subject matter is placed. Thus, when you take a picture of your subject on one portion of your film, the remaining portion which includes only the black background remains unexposed, and can be used to record a second picture. However, when posing your subject for the second shot, make sure that the previously exposed area includes nothing but the black background.

To make sure that the second portrait is properly composed in relation to the first, trace the outline of the first one on the ground

Below: *One of many variations of the dual portrait idea.*

glass screen of your camera with an eyebrow pencil, as shown in the lower left corner of this page. Do this immediately after making your first exposure, and while the subject is still posed.

The dual portrait in the lower left corner of page 93 was made by posing the subject facing the camera and directing a strong spotlight against the right side of his face. This left the other half of his face in deep shadow, which blended into the black background. Thus, it was possible, in posing the second profile shot, to permit the pose to overlap into the shadow area of the first portrait and thereby produce the novel effect shown.

The photograph above it was also produced against the black background with two separate exposures. You can vary the effect of this stunt by either having your subject pose with a different expression in each shot or by having the different poses reproduced in varied sizes by taking some from closer camera positions than others.

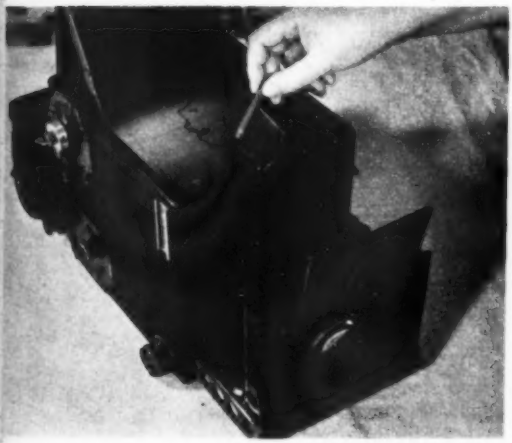
Another portrait novelty can be accomplished by superimposing profile negatives, as illustrated on this page. To do this, first make a set of these negatives by the following method:

Pose your model against the black background and throw a strong spotlight from behind the head so it will just light up the profile outline. Use an exposure just sufficient for recording the illuminated outline. The resulting negative will be clear film except for the black outline of the subject's profile. Make two or three such negatives of your subject in the same position, and, if you wish, you can seat other subjects in the same place and make profile negatives of them, too.

The basic multiple idea varied to portray a triple profile.

When these negatives have been developed and dried, superimpose them and study the various effects produced when you shift them around. You can use profile negatives of the same person or mix them up as you wish, and when you have an effect you like, just tape the set together in the desired position, with cellulose tape, and place them in the enlarger. By printing through the combined set of negatives, you will get just the effect you want.

In fact, you can use this superimposing trick with any combination of portraits that were taken against a black background.



Left: *How the position of the first image is traced on the camera screen to avoid overlapping with the second figure.*

Below: *Superimposing three of four profile negatives made for printing triple profile effect shown at top of this page.*

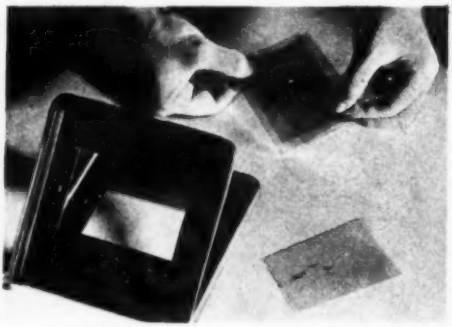


PHOTO CONTEST

FIRST PRIZE ($10.00): "Don't Let It Happen Again" by Mrs. J. Donahue, 47 Mt. Bowdoin Terrace, Dorchester, Mass. SECOND PRIZE ($5.00): "In the Groove" by A. F. Janko, 8668 Riverside Avenue, Hollywood, Ill. Taken with a Korelle Reflex on Super XX film; f/5.6 at 1/500th second in heavy snowstorm. THIRD PRIZE ($4.00): "Chores" by Robert A. Bohlen, 56 South Middletown Road, Pearl River, N. Y. This table-top was taken with a 620 folding Kodak with a portrait attachment, on Verichrome film in D-76; f/22 at 1½ sec. by No. 1 Photoflood and reflector. Background was painted; trees were made of arbor vitae; barn, cardboard; fence, cigarbox wood; snow, cotton and salt; figure and pail, modeling clay and cloth. FOURTH PRIZE ($3.00): "Farewell" by Percy S. Shore, 632-20W, Saskatoon, Sask., Can. Taken with a Kodak Monitor special on Super XX in D-76; f/8 at 1/50th second with K2 yellow filter on a cloudy day in December.

Submit prints for this monthly contest unmounted—no larger than 8x10 inches. With each print, list your camera, film, lens opening and shutter speed, illumination, and developer. Write your full NAME and ADDRESS on the back of each print and wrap securely with cardboard or corrugated stiffeners. If you want unused prints returned, you must enclose return postage. (Published prints can not be returned.) Address: Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

1st PRIZE

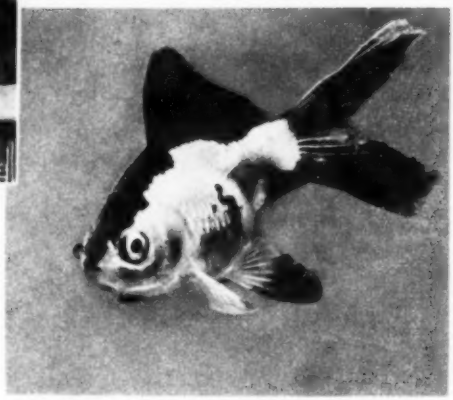
2nd PRIZE

3rd PRIZE

4th PRIZE

CAMERA AQUA-BATICS

Above: The glass panel, a little smaller than the tank dimensions is moved forward to restrict the movement of the fish. Left: The "basic" lighting arrangement—one photoflood from the side, angled at 15 degrees, and a second flood on top of the aquarium. Camera must be close.



The gold-fish portrait, shot without special background.

by Roy Lester

GOLD-FISH portraiture is not the difficult task that many individuals who are not conversant with the capabilities of modern photography are inclined to believe.

No high-speed shutter is necessary to stop the fish as it darts from one corner of the aquarium to another. This is taken care of by a glass panelling arrangement. The fish portrait is not characterized by blurring because properly placed lamps coupled with superspeed panchromatic film emulsions permit the use of fairly rapid split-second exposures; and then, in a pinch, there is always synchronized flash.

The smaller the fish to be portrayed, the closer the camera must be to the aquarium. A double-extension plate-back camera would be ideal. Lacking the convenience of double extension bellows, a close-up "portrait" attachment or a set of extension tubes (if the camera lens is removable) permits the camera to be brought close enough to the subject to allow a large negative image to be produced.

It's best to remove plants and sand from the fish tank to quiet the atmosphere. Place a pane of glass, cut a little smaller than the dimensions of the tank, into the tank parallel to the front panel through which the picture will be made. Move the panel close to the front, thereby limiting the space in which the fish is free to turn around. This will simplify the focusing problem, since the bright lights would tend to make the "subject" nervous.

[*Continued on page* 148]

MAGNETIC MIDGET FLASH

A home-built synchronizer for bayonet-base flash lamps.

Fig. 1 (above): How the compact magnetic midget flash is attached to Compur-type shutter on a wooden lens board. Text indicates adaptation to other types. Fig. 2 (left): Battery case with end removed. The large screw directly behind the top battery cell attaches the reflector to the case top.

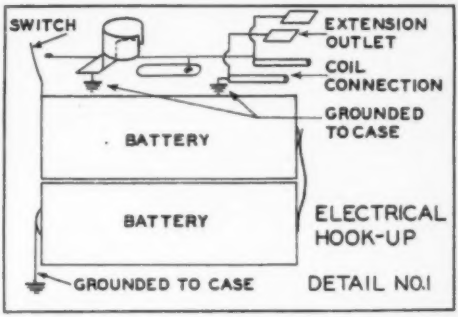
by Frank Caporael

AS TIME goes on, the trend toward the use of midget, bayonet-base flash lamps grows more pronounced. The Press 25 Superflash and the No. 5, No. 6 and Speed Midget lamps in the mazda Photoflash family are winning more and more constant users each month.

Despite this ever-increasing interest, the synchronizing and firing equipment offered for use with these compact, efficient flash lamps is, to a large extent, in the field of adaptation.

The magnetic midget flash synchronizer described here will perform for the midget flash the various functions that regular full-size equipment does for medium screw-base flash lamps, and it also offers the advantage of compactness.

All that is required to construct the apparatus is the usual assortment of household tools: hack saw, wood saw, hand drill, and a few files. A 6-32 tap for threading holes is the only additional equipment needed. This may be had from most five-and-ten cent store chains.

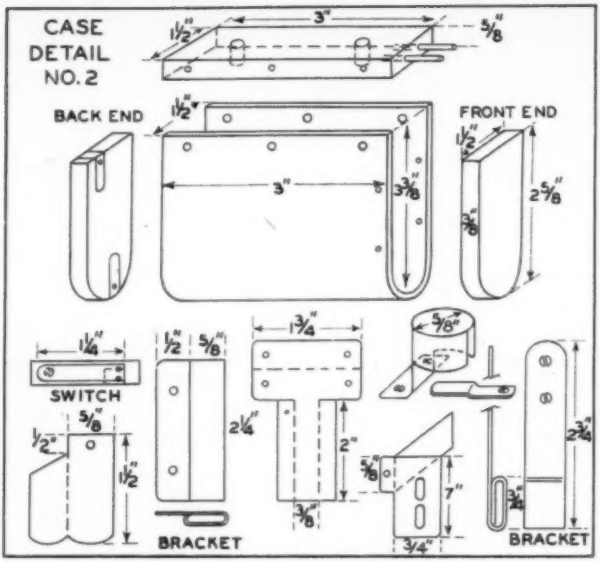


Detail 1 (above): The complete circuit in the battery case.

The two component parts of the apparatus are the case and the tripping mechanism. We shall first discuss the construction of the case.

The body of the case is made of a single piece of $\frac{1}{32}$-inch scrap aluminum, brass, or sheet steel. It houses two normal size batteries. Dimensions for cutting and shaping are shown in Detail 2. The two ends of the case and the top are all made of wood. Hard wood is preferable, although almost any kind will answer the purpose. In making these parts, it is best to cut them slightly over-size and sand them down for a good snug fit.

The top part of the case carries all the



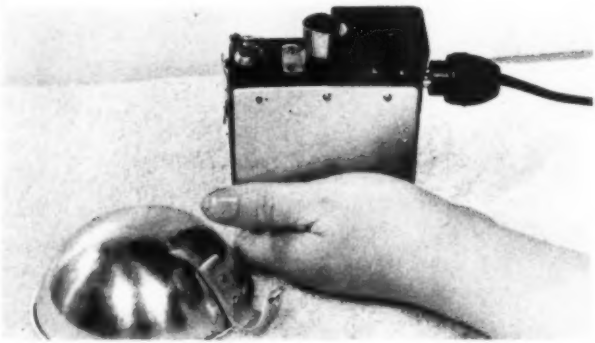


Fig. 3 *(above): The assembled battery case—with the operator's thumb pressing down on the switch which trips the shutter and fires the bulb in synchronization when the complete unit is assembled.* **Fig. 4** *(right): Top and right-side view of the battery case with round-prong plug and cable from the tripping unit. The large screw with the wing-nut holds the reflector bracket to the case when the unit is completely assembled. Parallel slits in the block at the forward end of the battery case are the extension cord plug-in.* **Detail 2** *(above, right): Case dimensions.*

electrical connections. It will be seen from Detail 1 that one side of the power supply from the batteries is grounded on the case. The other side of the power is routed through the switch on the back of the upper cover of the case.

The bulb socket is cut from spring brass material to the shape and dimensions shown in Detail 2. Another piece of the same material forms the center contact for the bulb. When the bulb is placed in the socket there should be a little tension so that it will be held in place rigidly.

If it is planned to use the small circular plug found on some commercial flash equipment, receptacle holes may be properly spaced in the lower part of the top of the case (Figure 4). If standard, parallel flat prong plugs are to be used, slots should be made in the upper part of the top. This top piece, incidentally, serves to protect the bulb socket and will also house a standard extension lamp outlet as indicated in the hook-up diagram (Detail 1).

The contacts in the interior of the plug receptacles are made of shim brass. This very thin brass is also used for other purposes throughout the equipment. A piece about two by six inches will serve for all the parts made of it. For the circular plug, make a thin tubing of the brass, large enough to fit the hole snugly. Drill a hole vertically in the block to meet the receptacle hole.

Now, pass a strand of copper wire through this hole and solder it to the tubing. Draw the assembly back into the hole and the copper wire will serve to anchor it in place. This same method is used for the parallel

prong receptacle, but instead of a tube, a single flat piece is used. To make these slots drill three small holes parallel to each other and then cut them to the proper shape with a small knife blade.

On the front end of the case, a single piece of shim brass on the interior serves as a contact between the batteries. This piece is screwed into place permanently. The back end of the case is held in place by a small slide fastened to the side of the case. This permits easy removal of the batteries. On the lower end of this part, a piece of shim brass makes contact with the body of the case from the battery; the upper side carries a piece of the same material, which forms the contact for the switch (Figure 2).

The switch is merely a piece of spring brass. One side is connected with the contact mentioned above. By pressing the piece the circuit is complete since this passes the current on to the side that is isolated from the case.

The only other part of the case to be made is the bracket and the socket for the case. These parts are illustrated in Figure 3 and Detail 2.

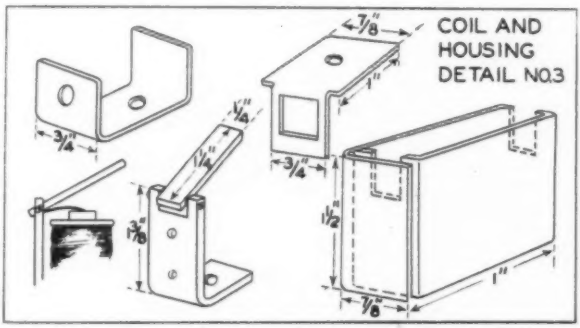
The reflector used is an aluminum dipper. Remove the handle and attach a piece of aluminum or brass strap. A bolt run through the top of the case and topped with a wing nut will hold the reflector in place.

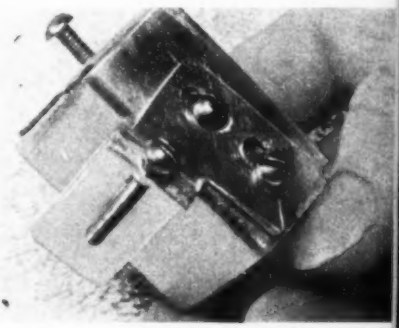
The tripper for the mechanism is of the magnetic type. This one requires care to make. The commercial article may be bought ready-made for from five to eight dollars. The main part of the tripper is the magnetic coil. The one used in this tripper was taken from a buzzer from a five-and-ten cent store.

The coil seat and the armature are made of soft steel strap. Accurate dimensions for these parts are given in Detail 3. The spring that lifts the armature away from the core of the coil is important. This must be very light. A small piece of shim brass soldered to the back end of the armature and resting on the top of the coil core serves the purpose excellently. The lightness of this spring determines the efficiency of the tripper. If too strong a spring is used, the magnetic field will not have enough force to draw down the armature with enough power to trip the camera shutter.

Drill and tap two holes at the back of the coil seat. Screws passing through the outer case hold the seat in place. Another hole in

[*Continued on page* 157]





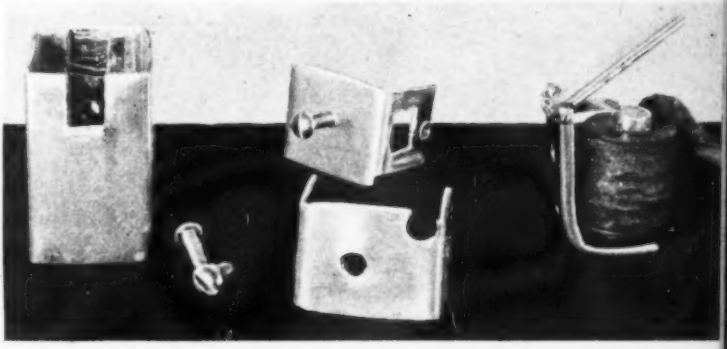
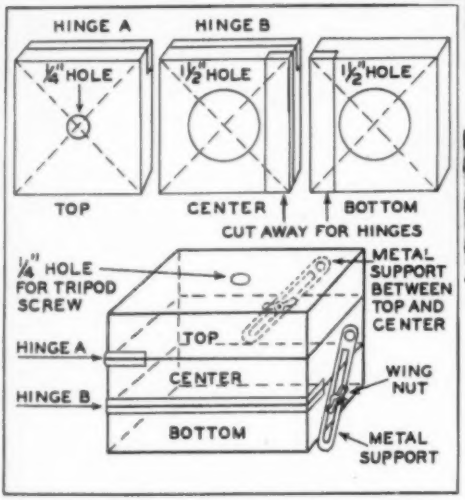


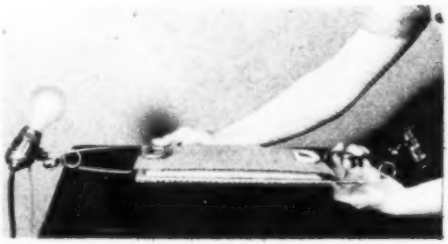
Fig. 5 (above and right): Close-up of the tripping coil casing. The two screws on back hold the coil in position and hold the coil bracket perpendicular; side screw regulates the horizontal setting; top screw position determines synchronization timing. Fig. 6 (right): Coil and housing disassembled. At extreme left is the housing; then the top of the casing with a screw in its top to regulate the armature movement. To right of latter (foreground) is the casing bottom with a small indentation serving to pass the electric wires. The coil itself, is placed in its seat at the extreme right; note the proper position of the brass shim material, here, and in Detail 3, *above. Armature should make good contact with the coil core.*

PHOTO GADGETS

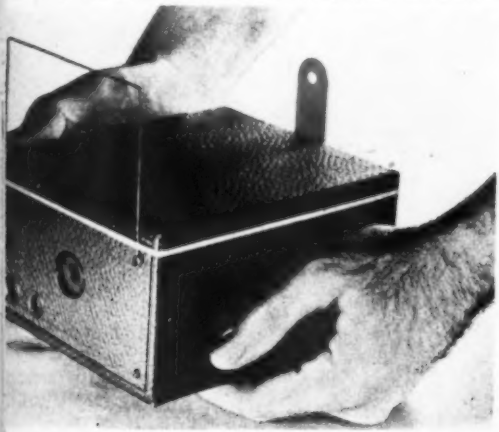


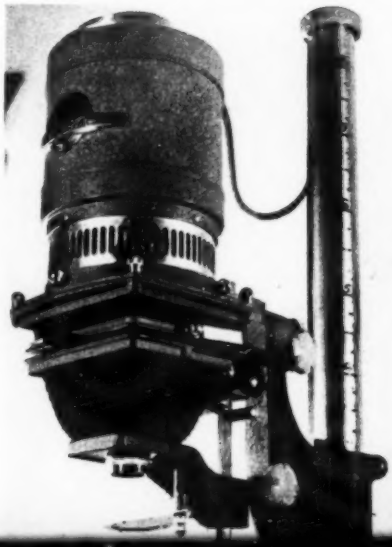
2-WAY TRIPOD TILT-TOP (above and left): *The improvised gadget illustrated permits the camera to be tilted laterally, forward, or both; its dimensions may be varied to accommodate different cameras. The piano hinges used are counter-sunk so that the three blocks stack flat when folded. Positions for counter-sinking are indicated in the detail diagram at the left. The completed tilt-top is mounted permanently to the top of the tripod by means of wood screws, which extend upward through the regular head into the lower block of the tilt-top. Supporting arms are then added; they must be strong and of fairly rigid material—attached by a round-head machine screw as indicated.*—Robert Eichberg.

Right: *In an emergency, prints may be flattened by placing them between sheets of corrugated cardboard, clipped between the clamps of two clamp-on lighting units.*—Louis Hochman.



Below: *A box-camera sports-action finder may be made from a wire frame bent to the shape and size of the camera's film area, and a piece of cardboard (at the rear) as shown. These are held in place with a rubber band and slipped down out of the way when they are not being employed.*—Robert Scott.





Right: *Enlarging can be simplified, especially where a variety of magnifications is covered by marking the enlarger upright with the number of diameters a negative is enlarged at each setting of the head. India ink, tincture of iodine, glass writing ink or an etching fluid may be used.*—A. J. Lockrey.

BACK TO THE BIKE

Fun, exercise and transportation can be had with the long-neglected bicycle, brought back by automobile restrictions.

by Roland Cueva

SCORNED for years by the bulk of the adult population, who preferred to whiz along the highways in their high-powered gasoline contraptions, the meek but dependable bicycle is about to inherit the earth—at least for the duration. The war is going to put people back on their feet, which means their bicycles, and this spring and summer will probably see a blossoming out of cyclists unequaled since the gay nineties.

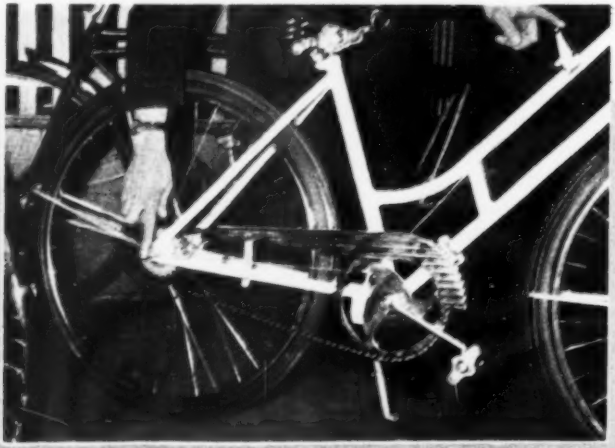
While the gas buggy sits in the garage waiting for the rubber, fuel and metal shortages to ease up, John Doe will suddenly discover that a lot of pleasure, good transportation and healthful exercise can be had with the old two-wheeler. He can ride to his work or his commuting train, his wife can ride to market, and the whole family can ride for an outing or picnic on Sunday. The budget will also benefit, and Mr. Doe can buy Defense Bonds with the money he saves over his car.

Scenes like that at the top may become common again, as the automobile gradually bows out for the duration. The lovely miss, directly above, finds that going without her car isn't such a hardship after all.

Unfortunately, all is not joy on the bicycle

Many bike stores are jammed with used vehicles, and the average buyer should have little trouble getting what he wants. Stocks are sure to dwindle soon, however.

Good reconditioned bikes are numerous and moderate in price. Bike expert Yeager of White Plains, N. Y., helps a young lady select one to fit her legs and finances.



front, at least as far as new bikes are concerned. There is no shortage of bike tires in sight at present, as the amount of rubber, mostly reclaimed, used in their production is comparatively small. There won't be many more of the fat balloon type tires made, however, so when you pick out your bike, be sure it has the new thin or the old standard single tube type of tires. They ride better anyway.

The production of new bicycles, on the other hand, will definitely be curtailed in 1942; only 750,000 units as against 1,800,000 units last year. And the new bikes will be all one type—the much publicized Victory model, which is not really a particular model at all, but a set of specifications, put out by WPB. Victory bikes will be produced by various manufacturers according to their own designs, but none may weigh over 31 lbs., have chrome plating or be trimmed with fancy, unnecessary gadgets. They will all use the same tire, 1⅜ inches wide, much smaller than the balloon tires. The Victories will be splendid bicycles, light and easy to ride. Coaster brakes will, of course, be standard, and additional running equipment available will include front wheel brake and two-speed drive.

The big hitch to these bikes lies in the fact that the number which can be manufactured will fill less than one-third of the estimated 1942 consumer demand. Also their retail prices, while not high, will still be more than many individuals will want—or need—to lay out for a bike. As a result, a large percentage of this year's probable record

Aid in uphill pedalling is the new 2-speed gear shift, shown at left and diagrammed in detail on opposite page.

crop of bicycle purchasers must obtain used or reconditioned machines, of which, happily, there are a great many on the market.

If you are in this group of purchasers, either by choice or necessity, and intend getting a rebuilt bike, you will find your local dealer well-stocked with good buys, probably ranging in price from $13 to $20. If you're more ambitious and handy with tools you'll want to obtain a used bike "as is" and do the reconditioning yourself. In this manner you can have a machine as good as new for an unbelievably low price.

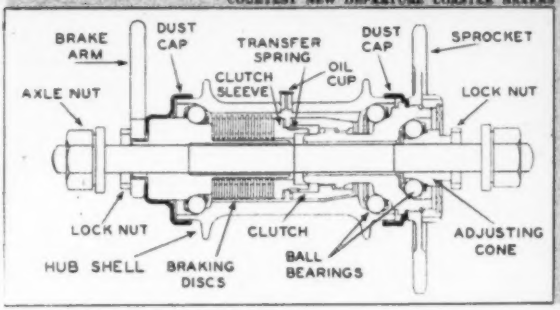
Proceeding on that basis, we'll tell you how to put the bike in first-class condition.

The accompanying illustrations will clear up any points not covered thoroughly here. Even if you've never seen a bicycle, much less worked on one, you should be able to turn out a creditable job by following these pictures, drawings and instructions.

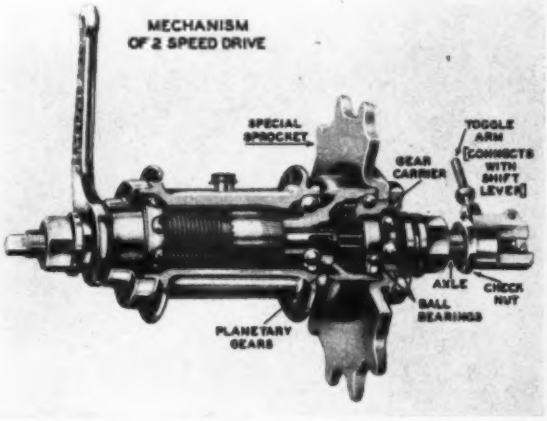
The cycle store in your neighborhood will most likely have a cellar full of used bikes, and $8 to $10 ought to get you one that's basically sound.

Since you'll probably be doing a fair amount of riding, an important consideration in the selection of any bike is weight. Pick one out that appears fairly light. Many of the bikes made in recent years have been unnecessarily heavy—literally loaded down with extra frame members, battery case and all sorts of extra equipment. To make them still harder to ride, they usually have wide-tread low pressure tires. Avoid this type. On the other hand, it is not necessary to get a super flyweight bike with fountain pen bladder tires to obtain easy-riding qualities. There is a happy medium; light enough to pedal well, yet heavy enough to roll smoothly and cut through the wind.

COURTESY NEW DEPARTURE COASTER BRAKES

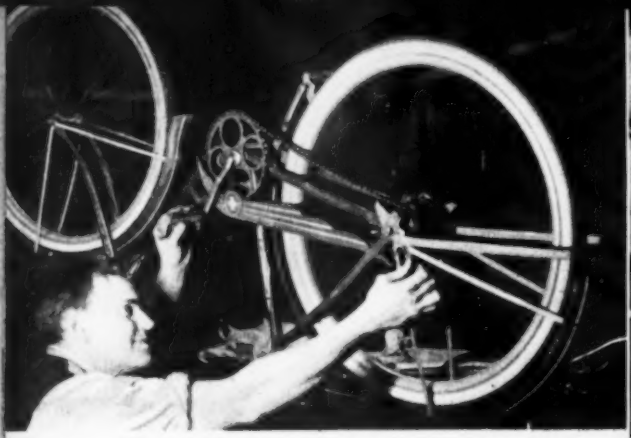


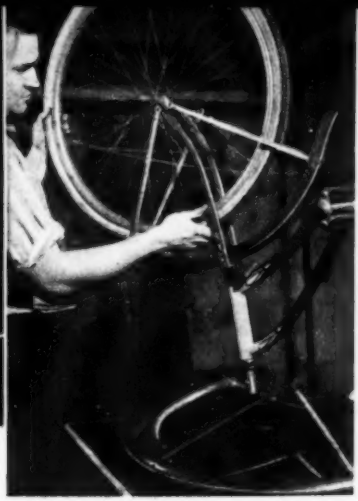
Coaster brake with 2-speed drive. Planetary gears operate on same principle as Olds Hydra-matic transmission. Gear unit is shown in low speed position. When in high, toggle arm pushes large center gear toward left along slot in the axle, disengaging it from the smaller low-speed gears.



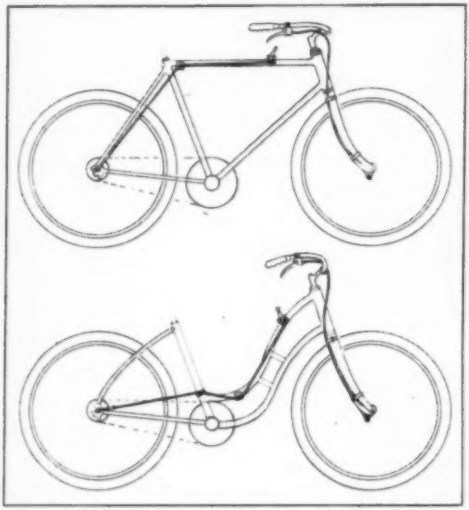
Cross-section of typical coaster brake. Braking disks are keyed alternately to axle assembly and hub shell. Wheel turns freely except when back-pressure is applied to sprocket, which squeezes braking disks together, thus stopping it. Action is similar to that of a nut tightened against a washer.

Here's the "before" picture of the bike we're going to overhaul. Condition was fair, mechanically, but neglected and banged up. Price was $10.00. Tires pretty good.

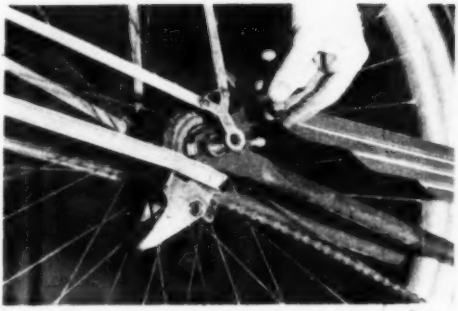




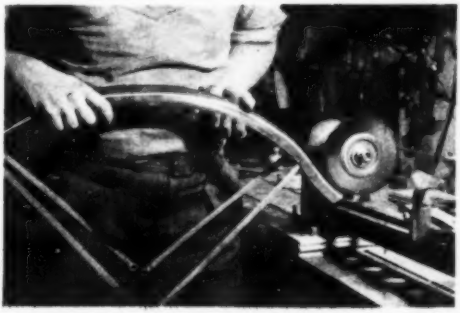
Above: With bike upside down coaster brake is tested. Right: Removing front wheel is a simple task. Note fork lock between fender and frame bar.



Suggested positions for controls of 2-speed drive on either man's or girl's bike. Cable pulley and shift lever are clamped to frame. Lever on handlebar is for front wheel hub brake.



Removing rear axle nut releases fender brace and stand.



After dents have been hammered out rust is cleaned from fender with aid of wire brush wheel on lathe or emery cloth.

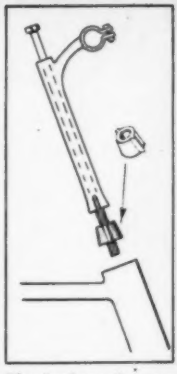
Seek one with a single bar frame, if a man's model, light mudguards and single-tube high pressure tires.

There are a few inexpensive accessories you'll need, and you may as well get them along with the bike:

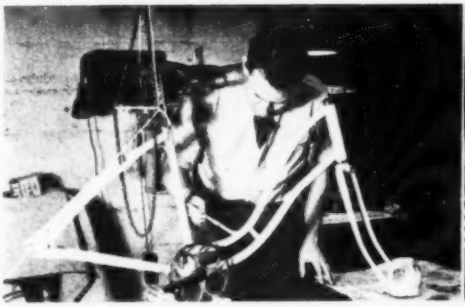
Combination bike wrench; cone wrench; heavy grease; rear reflector; extra valve cores. Optional but advisable are: Carrying basket; clamp for flashlight; spare tire and tire glue; lock; tire pump; tire repair kit. On the way home stop at a hardware store and get a half pint of flat undercoat, a half pint of outdoor enamel in desired shade, medium emery paper and steel wool. Also a couple of ten cent paint brushes and some turpentine.

Before taking your "new" bike out of the bike shop, have their service man check the wheels for warp or bad spokes, adjusting tension or replacing a few spokes, as necessary. This will only take him a few minutes, but would be rather a ticklish job for an inexperienced person, as just the right amount of opposing pull must be exerted on different sides of the rim to true it up.

Left: Twisted fork is straightened with wrench and C clamp. Vise is better if handy. Below: Clean off dirt and grease with alcohol or gasoline.



Sketch shows how tapered "nut" wedges handlebar tube in steering column when tightened from top. Ears on nut must go into slot in the tube.



Left: Frame is supported from above while painting. Note chain hung up out of way. Right: Final step after reassembly is stringing skirt guard on rear fender. Air Corps insignia was painted on paper, cemented in place and varnished. Below: Finished result. A new bike in appearance in performance. Bermuda basket and flashlight are useful, inexpensive accessories.

Reconditioning The Bicycle

Start by turning the bike upside down, on a convenient table or the floor, so that it rests on saddle and handlebars. Remove the front wheel by taking off the axle nuts, snapping fender braces loose and slipping the wheel out of the fork. Unscrew the front fender from inside the fork. Put the screw and washer carefully in a box or jar.

Rear wheel comes next, and if there is a chain guard on the bike you'll have to get it off first. Place screws and nuts from guard in a separate jar and label it. Incidentally, you should follow this procedure for each part of the bike, so you won't get mixed up when reassembling. Any fastenings that are badly rusted must be replaced. On each side of the rear fork just in front

[*Continued on page* 154]

Make Your

Howard Hill, the world's greatest archer, prepares to let fly a hunting arrow.

by Charles and Bertram Brownold

THE Flat Bow takes its name from the fact that it is made from a flat stave and when finished is flat in section, except at the handle, at the center, and the tips. In this particular it differs from the English long bow, a cross section of which might be described as a triangle with rounded corners.

The method of making a flat bow described in this article is a modification of the manner in which the American Indians made their bows. But the craftsman of today, having at his disposal methods, materials and tools of which his savage brother never dreamed, can produce a weapon superior to the Indian's, whether it be used for hunting or for target practice. The flat bow is the easiest of all bows to make, but the equal of any in appearance and performance.

The best woods to use for a flat bow are lemonwood, hickory, yew, and osage orange. A flat bow may be any length from five and a half feet to six feet, so that it is necessary to secure a piece of the correct wood of the

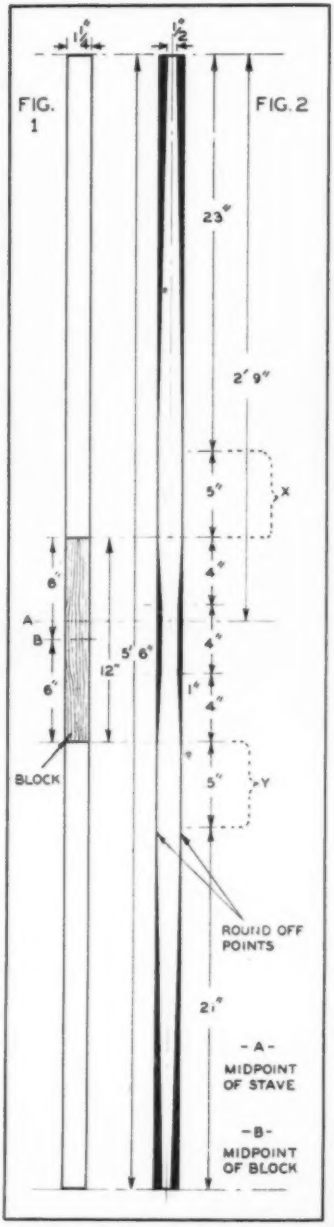


Fig. 1 shows where the block is glued to the stave. Fig. 2 shows how stave and block are planed and shaved to shape of bow. The darkened areas are cut away.

Own Archery Equipment

Above: Scraping wood from the belly side of a bow with a spoke-shave. Note that one limb of the bow is set in the vise of the workbench, while the other limb rests on a work table next to the bench. The bow must be taken from the vise and put on the tillering jig frequently.

There is no finer sport in the world than archery, either target shooting or hunting. There's an added kick to it when you make your own equipment. This article gives you the complete details.

desired length, measuring 1¼" to 1½" wide by ½" to ⅝" thick. Such a piece is known as a "stave."

Also secure a block of walnut, mahogany or any hard, fairly fine-grained wood, of the same width as the stave, by ⅝" thick by 12" long.

Glue the block to the stave under pressure in the position shown in Fig. 1. It will be observed that the block is not glued at the exact center of the stave. This is because the block will later become the grip, or handle of the bow, and since the arrow must leave the bow from a point near its center, the handle must be below the center, for the archer's hand is

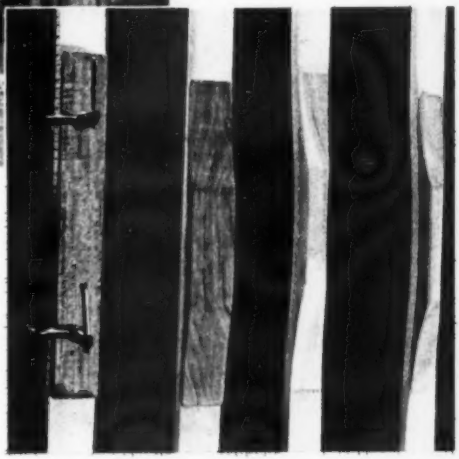
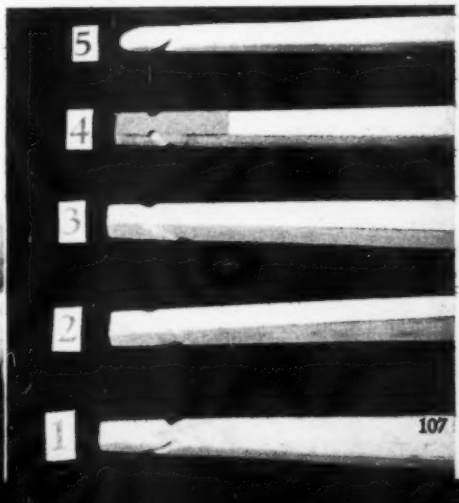


Photo 1, above, shows the steps in shaping the handle. At left, the block and stave are glued up, held with clamps; the next shows the block partially shaped; the next, the stave and block are shaped; and, at the right, the block has been rounded and smoothed to form the grip or handle.

Photo 2, at the right, shows the position of the nocks. 1, as seen from the belly; 2, as seen from the side; 3, as seen from the back; 4, the bow end reinforced by a fiber plate; 5, the bow end rounded and sanded. Photo 2A, below, shows a nock being cut with a rat-tail file.



Howard Hill lets an arrow fly. Note that both hands are parallel to the arrow shaft, and bow is slanted at an angle. Both eyes are open when sighting the arrow at the target.

Above: One limb in a vise, the other resting on a table, the grip is shaped with a half-round file. Below: Rounding off the handle with a strip of sand paper.

below the arrow. A good rule to follow and stick to is to glue the block to the stave one inch off center, no matter what the length of the stave may be.

Next, with a plane and spoke-shave, shape the stave as shown in *Fig. 2*. The darkened areas in *Fig. 2* indicate the wood that is to be removed.

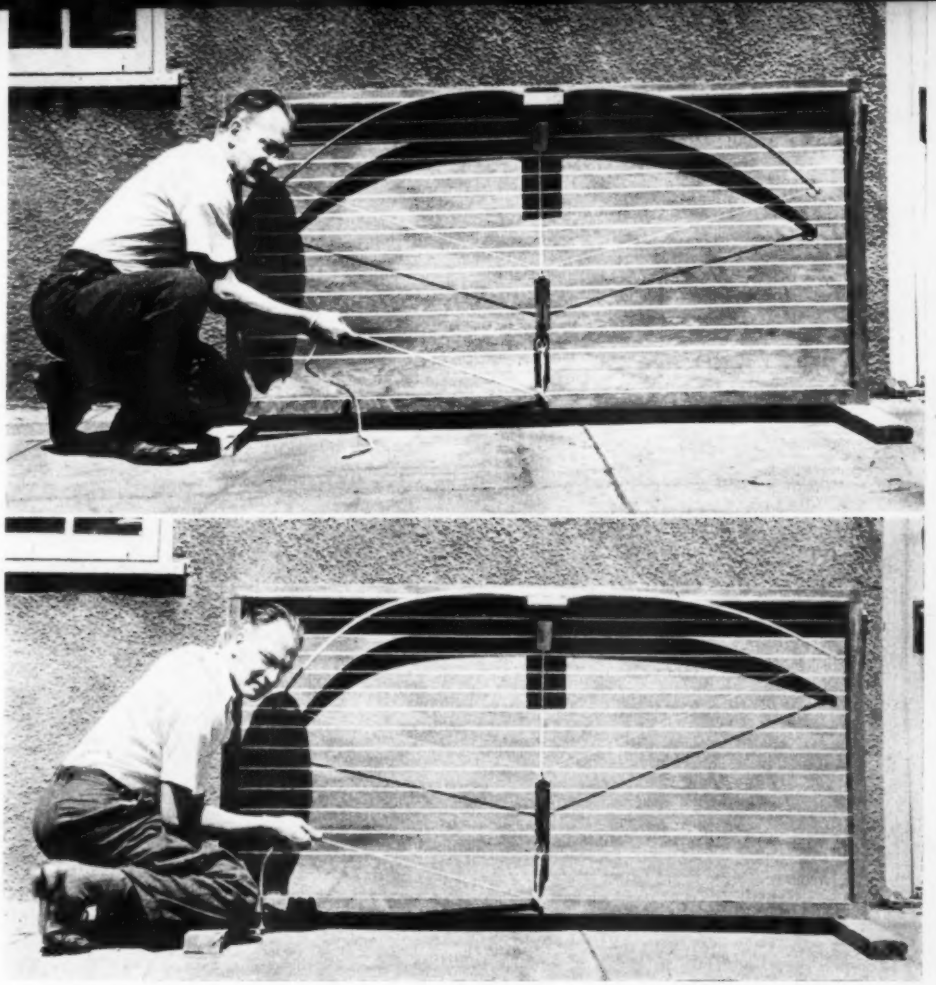
After the stave has been cut in the manner described, round off the angles slightly with a file and sand paper. The points at which the rounding is to be done are indicated on *Fig. 2* by arrows.

The next step is to make the handle, or grip, of the bow. The tools, again, are the plane and spoke-shave. *Photo 1* shows the various steps in shaping the handle.

Now file the "nocks" in the bow, near each end. The nocks are grooves in which the bowstring rests. Use a rat-tail file. The position of the nocks is shown in *Photo 2*. *Photo 2A* shows a nock being cut.

The bow is now ready for the "tillering" process. Tillering is the gradual, bit by bit, removal of wood from the proper places on the bow until it will bend in the desired arc. To do this properly a tillering jig is needed. Such a jig consists of a support (a small shelf) on which the handle of the bow rests, a spring scale of the type shown in *Photo 3* and *Photo 4*, a pulley, and a piece of rope. Fasten

Left: Using the spoke-shave on the handle, or grip.



Use of the tillering jig. Photo 3, at the top, shows a bow bending in a perfect arc. Note that the right limb of the bow is longer than the left, which is as it should be, since the handle of the bow is not at its mid-point. Photo 4, directly above, shows a bow whose limbs do not bend equally. It will be necessary to remove wood from the right limb. The white lines make the discrepancy easily seen.

the shelf on the wall about three feet up from the floor and fasten the pulley to the floor directly beneath it. Then, between shelf and pulley, draw a series of parallel chalk lines about two inches apart. The curve of the bow can be sighted against the chalk lines and if the two limbs are not bending equally, or if the curve of the bow is not the smooth and correct arc, the error is apparent at once.

A portable tillering jig such as is shown in *Photos 3 and 4* is even better as it permits of the work being done indoors or out, depending on the weather. Such a jig is made of a piece of plywood measuring 3′x6′. This is a stock size, so no cutting or waste is involved. The plywood is prevented from bending by a frame of 2″x2″ and is held upright on supports of 2″x4″.

The first step in tillering the bow is to take a piece of good stout cord, loop it into the nocks, and draw it taut. This cord is *not* the bowstring; it would be wasteful to fray and wear a good bowstring on a tillering job.

Place the handle of the bow on the shelf of the tillering jig, hook the scale onto the cord at its center, and pull the rope through the pulley.

Pull on the rope until the bow bends. Do this gently at first, as the bow will bend only slightly. Then remove a little wood from the "belly" side of both limbs of the bow. The con-

[*Continued on page* 159]

YELLOW JACKET —Remote

by B. W. Chalmers, Jr.

Editor's Note:
These plans and descriptions are published for the use of the private model builder only. "G" Line Flying was developed by and is the property of Victor Stanzel & Co., of Schulenburg, Texas, holders of U. S. Patent No. 2,236,348 on Controls for Miniature Airplanes.

Above: Motor whining, Yellow Jacket is ready to take off. Fairings have been added over the music wire landing gear, in an effort to pick up extra speed.

ALTHOUGH the G-Line method of flying is the idea of Victor Stanzel, the design of *Yellow Jacket* is that of the author.

G-Line Speed flying is fast becoming a popular sport among model builders throughout the country, and this ship was designed for those who love speed. Powered with a four-year-old Atwood Phantom, this plane has done 40 m.p.h. consistently and was once clocked at 51.27 m.p.h. Stanzel has reached speeds of over 90 m.p.h. using a similar design with higher power.

The plane is flown on a 50 to 75-foot fish-

Below: A hard snow crust in winter provides a good "airport." Note booster quick-starting batteries.

Here is the answer to the experienced model plane builder who wants flights of high speed and long duration without the danger of damage to his ships or loss. The Yellow Jacket is intended for advanced builders, and flies in a circle at the end of a wire tether. The special design of the ship must be carefully followed. The principle of operation permits high speed flights of any practical duration within an amazingly small area under constant control.

Control Speed Plane

Above: Twenty feet off the ground Yellow Jacket picks up speed. Right: Two laps later doing almost 50 m.p.h.

line, about 25 to 30-pound test, hitched to a stout pole. Fly the ship in right hand circles with the rudder turned to the left position, tending to pull the model toward the outside of the circle. Before we start construction, a word of warning—*Don't fly this ship in high winds or over rough landing ground.*

Construction

Begin with the fuselage. It is built in the conventional manner using ¼ square longerons, uprights, and cross braces. The wing mount is 2 pieces of ⅛-inch hard sheet balsa. The bulkheads are ⅛-inch sheet—⅛x⅜-inch soft balsa planking strips extend from the front of the fuselage to No. 3 former. Plank from No. 3 former to the tail post with $\frac{1}{16}$-inch soft balsa strips, varying in width, to form the fillets.

Attach the stabilizer before planking the rear of the fuselage.

[*Continued on page* 126]

Improving Your Grinder

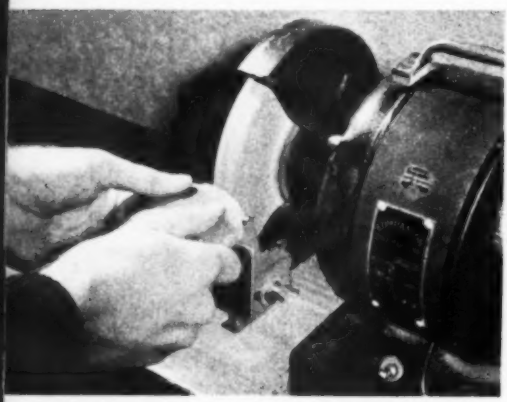
by W. A. Conway

Attach larger rubber feet to minimize vibration.

MANY electric grinders, especially the less expensive ones, can be improved considerably in a number of simple ways.

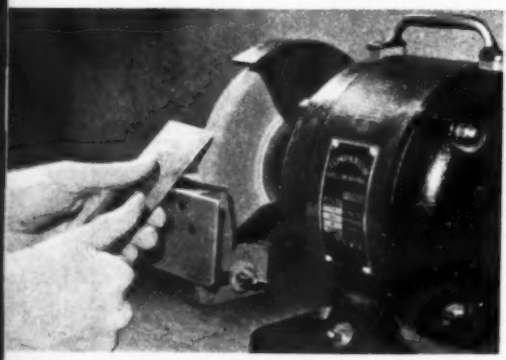
One difficulty often encountered is excessive vibration, which causes the grinder to creep about the work table. In order to reduce vibration to a minimum the small rubber bushings under the base should be replaced with large rubber feet. Make these of any thick, tough rubber, such as any of the various blocks or pads found in auto supply stores; accelerator pads, or even pieces of rubber heels.

Vibration can often be traced to abrasive wheels which are slightly out of round. These can be reconditioned by holding another worn or broken grinding wheel against them as they revolve. For best results, this should be of a coarser grit than the wheel being surfaced. This method is more satisfactory than the steel emery wheel dressers ordinarily used when a smooth, straight wheel face is desired.



Truing a good abrasive wheel with a discarded one.

The tool rest is another source of poor grinder results. This is usually too small, and of such an irregular shape as to make the proper grinding of plane irons, chisels and similar tools extremely difficult. To remedy this, a plate of ⅛″ steel approximately 2″x4″ in size should be fastened to the front of the tool rest with machine screws. This enables the first finger to be used as a guide in grinding.



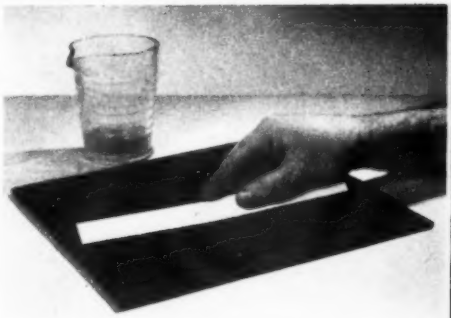
Extra tool rest plate helps accurate grinding.

Although grinders are usually equipped

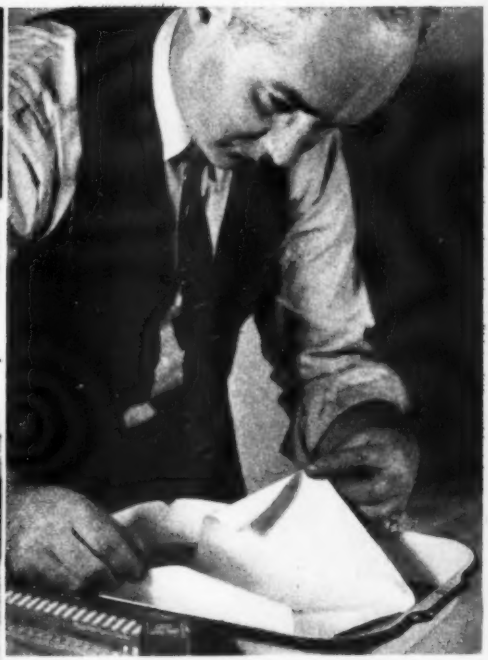
[*Continued on page* 155]

Left: Standard cloth buffing wheel does fine polishing jobs. Below: Convenient carrying handle made from window lift.

Renewing Hectograph Surface



Coating the base with a layer of hectograph compound.



Above: Sheets of bond paper are floated on the warm hectograph compound, then laid on a level surface until gelatine sets. Left: Usual number of copies may be "pulled," after which a fresh compound-coated sheet is attached to the base.

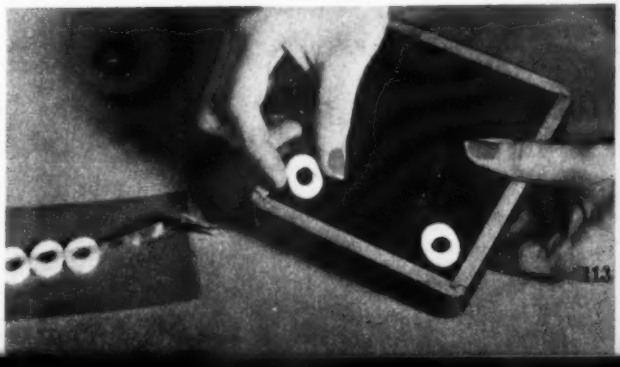
WITH the ordinary pan-type of hectograph it is necessary to clean the surface before it may be used again, or else to wait until the old ink sinks into the material. The following method of making a hectograph makes it possible to have a clean surface at any time, insuring clean work when two or more copying jobs are to be done in succession.

The base is made with a piece of thin wood slightly larger than the copy to be reproduced. Black tempered composition wood is ideal for the purpose as it is not absorbent. Purchase a can of hectograph compound, or else make it with 1 part of clean granulated glue, 2 parts of water and 4 parts of glycerine, all measured by weight and melted together. Warm the base and pour a little of the compound on it, spreading it into a thin layer with a strip of cardboard. Place the remainder of the compound into a tray and on it float, one at a time, a number of sheets of bond paper. Lift each sheet of paper from the compound, quickly invert it and lay on sheets of waxed paper which have been placed on a level surface. The base and sheets of paper are ready for use as soon

[*Continued on page* 157]

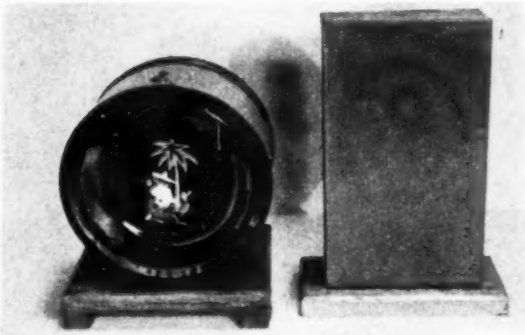
Corn Plasters Protect Finish

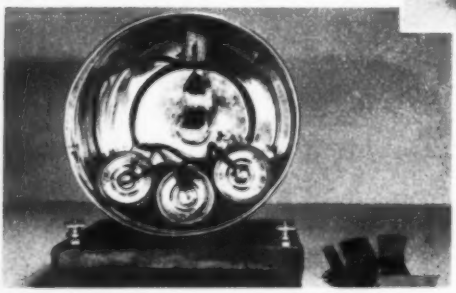
FELT type corn plasters make excellent non-scratching "feet" for small boxes, book-ends and bric-a-brac to be placed on highly polished surfaces. They may be obtained in a variety of sizes.—*B. N.*



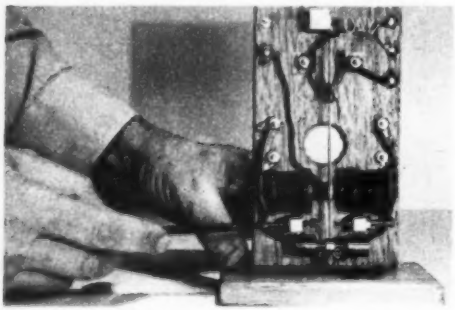
HAND-CLAP RADIO CONTROL

Just a clap of the hands anywhere in the room will cause your radio to turn itself on or off as if by magic. The secret lies in the simple piece of equipment pictured at right—a relay (upright) and sound box built into an empty coffee can. You don't have to be a radio expert to make this entertaining radio accessory; follow the diagrams and easy instructions and you'll have no trouble.





Above: Interior of the sound box with flashlight cells in place. Cardboard battery shield lies at right of box. Below: Adjusting sensitive contact springs on the sound relay.

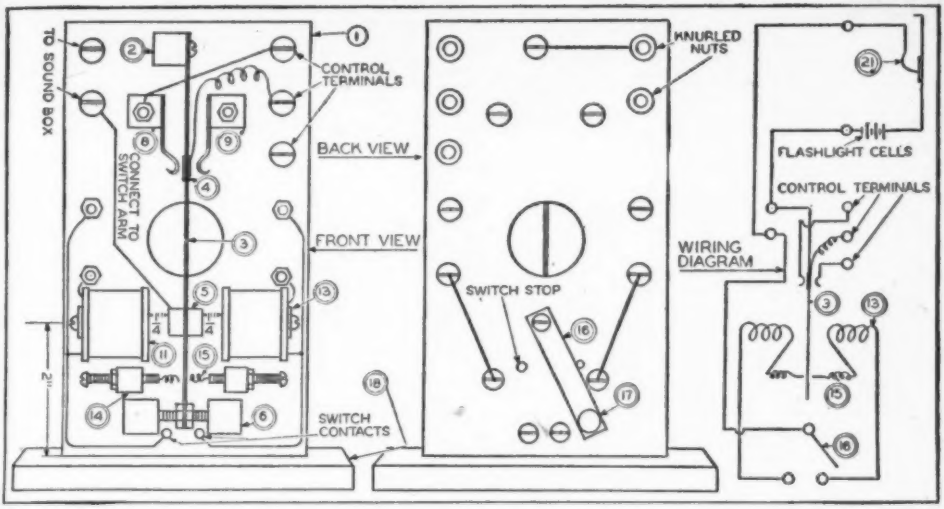


Below: Winding a coil for the relay with the aid of a small hand drill held in a vise. This method insures accuracy.

by Walter B. Ford

WITH this easily-built sound relay, you can turn your radio on or off from your easy chair by merely clapping your hands. Other electrical appliances such as lamps and small motors may be similarly controlled at distances up to 100 feet. Since the relay operates from very low-frequency sound waves caused by cupping the hands, other sounds above that frequency will not affect the relay, regardless of their volume.

The apparatus consists of two units—the relay and the sound box. The relay is mounted upon the upright wood board, shown in the drawings at Figure 1, which is in turn mounted upon the wood base, Figure 18, after the relay is assembled. The lay-out, drilling, and tapping of all parts are illustrated. The U-shaped copper contact piece, Figure 4, is insulated from the armature strip, Figure 3, by means of friction tape. The tape is first wrapped around the armature strip, after which the contact is clamped in place with pliers. For the stationary contacts, two pieces of sheet copper are cut to the shape shown at Figure 7, after which they are bent to the shape shown at Figures 8 and 9. The spools for the electromagnets are made up from the soft steel cores shown at Figure 10, and the fibre rings, Figure 11. Wrap each coil with approximately 350 feet of No. 30 enameled magnet wire. Before winding the cores, wrap each one with a layer of thin paper. The mounting brackets for the electromagnets consist of the flat steel piece, figure



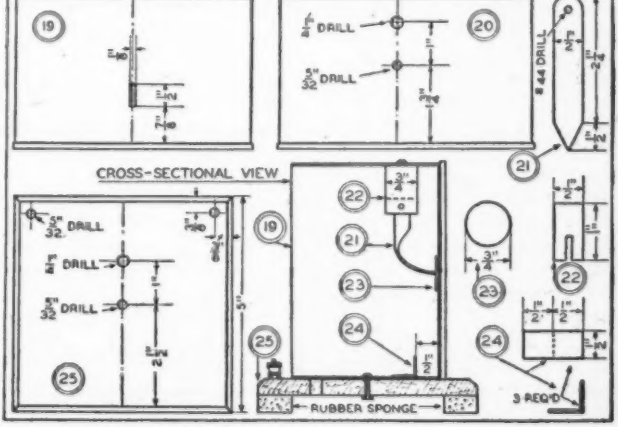
Wiring diagram and position of parts in the relay box are shown above. Numbers indicate parts referred to in text and materials list. At bottom of page is drawing of sound box.

12, bent as shown at Figure 13. The round steel pieces, Figure 5, are mounted on the armature strip with an iron machine screw from which the head has been removed. The counter-weights, Figure 6, are similarly mounted at the end of the armature strip.

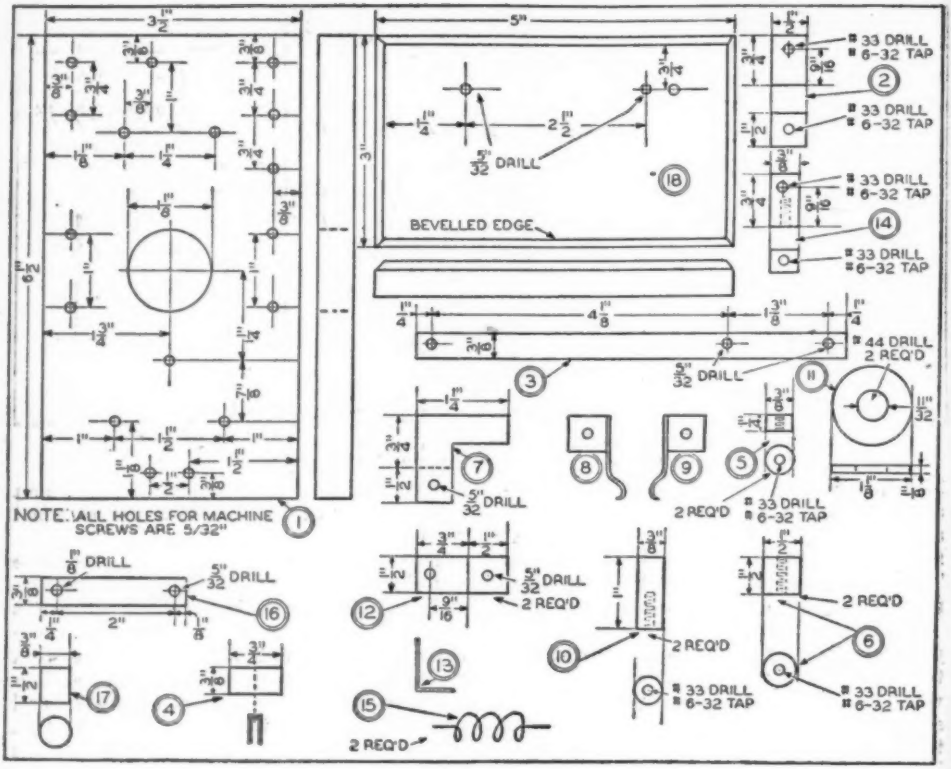
The switch at the back of the relay board provides either one or two-way operation of the relay. When the switch arm is in contact with one of the switch points, actuating the sound box will cause the armature of the relay to swing to the center position, where it will be necessary to reset it for the next operation. In the two-way position, each sound impulse will cause the armature to swing from one magnet to the other, turning the circuit on or off at each swing. For two-way operation the switch arm should make contact with both switch points at the same time.

The wiring may be followed from the front and back views, or from the wiring diagram. Of the three control terminals, only two will be used at one time, depending upon whether the outside circuit is to be opened or closed. The coil ends are brought out to terminal screws to avoid the possibility of breaking the wire. In the front view, the coil end is shown connecting to the lead for the sake of clearness; actually, both leads should be connected at the terminal screw.

The sound box consists of a 1 lb. coffee can, slotted on one side, as shown at Figure 19, and drilled on the opposite side, as shown at Figure 20. A copper disk, Figure 23, is soldered to the center of the bottom of the can. A piece of sheet copper to serve as the pendulum is cut to the shape shown at Figure 21, and bent as shown in the cross-sectional view. The wood block that supports the pendulum is mounted to the can through the slot by means of a wood screw. The relay may be actuated by means of three flashlight cells



Here's how you drill the panel chassis of the relay box. Compare this drawing with the photo of the relay on page 114 and you'll see how it fits together.



placed within the can, or by larger dry-cells placed outside. The current drain is approximately one-tenth ampere, so a set of small cells will give very satisfactory service. When the cells are placed within the can, several retainers should be soldered to the can to keep the ends of the dry cells from resting against the bottom of the can. These retainers are shown at Figure 24. As a precaution against short-circuiting, the cells should be wrapped with a layer of friction tape, or a cardboard guard, as shown with the sound-box interior photograph, be placed over the cells. A small piece of sponge-rubber should be placed at each corner of the sound box base to prevent outside mechanical vibrations from operating the relay.

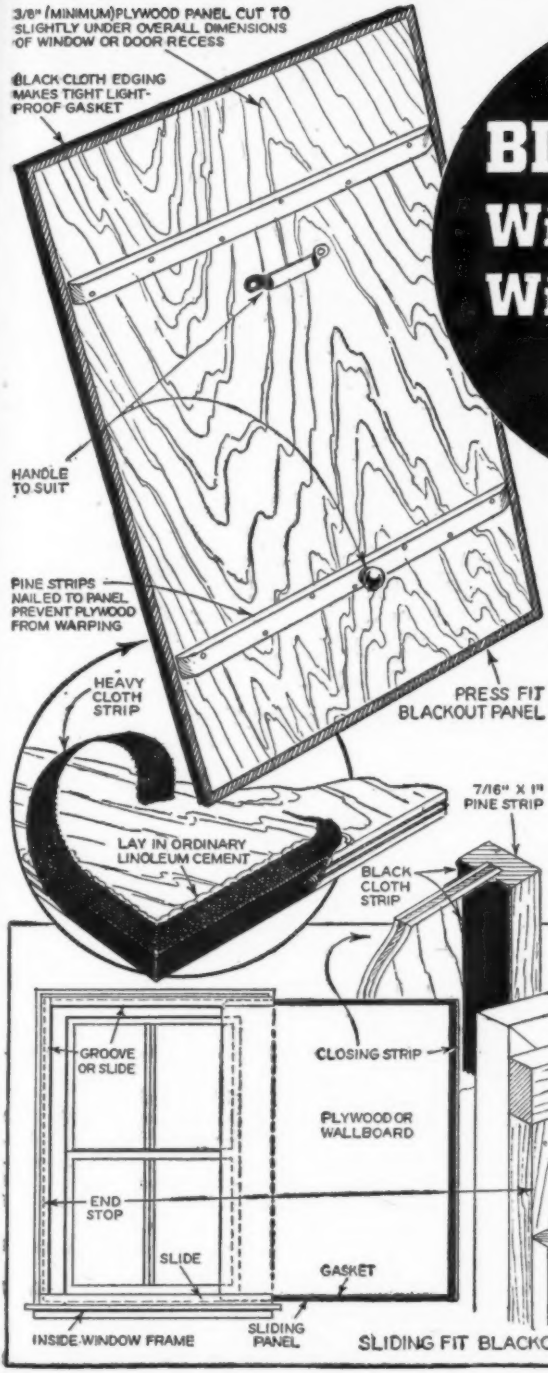
In adjusting the relay for two-way operation, the springs, Figure 15, are adjusted so that they will make contact with the armature strip just before the steel pieces, Figure 5, touch the magnets. For one-way operation, the spring is so adjusted that it will not make contact with the armature strip again before it comes to rest. Moving the counter-weights, Figure 6, will help in adjusting the armature strip. The pendulum in the sound box should be adjusted so that it just rests against the copper disk. When the sound box and relay are properly adjusted and connected together, the relay should respond to the sound of the hands clapped at a distance of 100 feet. When used to control a radio set, the sound box should be placed at the side of the radio to prevent it being operated by sounds emanating from the radio.

After the back cover, originally the top, has been placed on the can, it may be painted some suitable color. The relay may also be provided with a wood or metal cover and painted.

[*Continued on page 158*]

BLACKOUT! With Plywood Window Panels

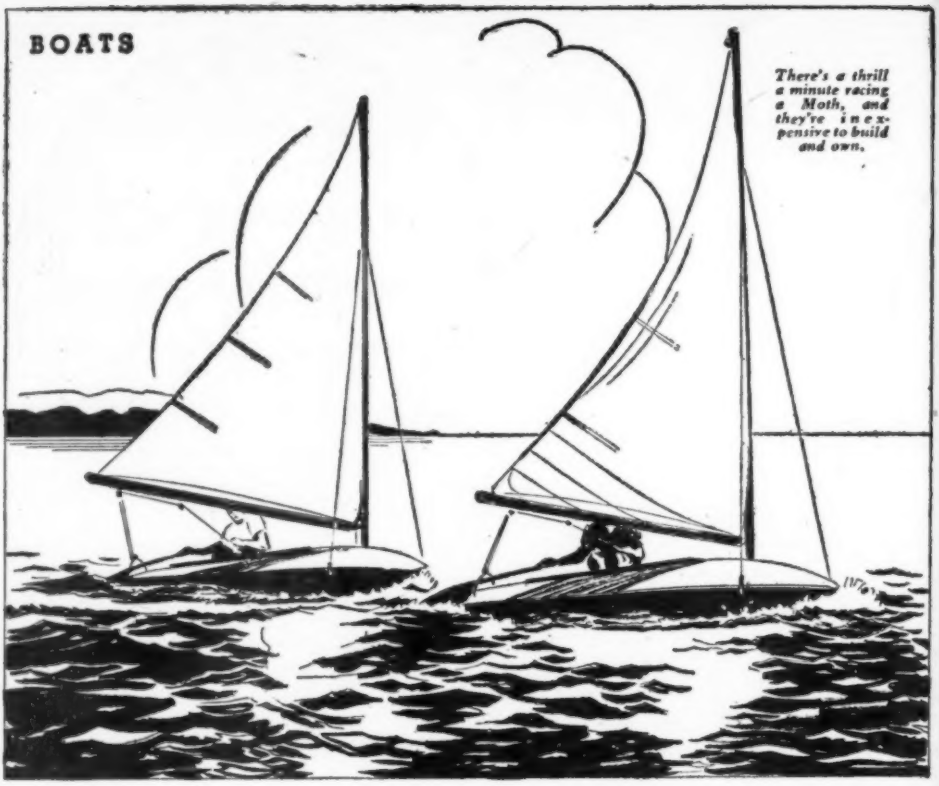
by Ben Maxwell


3/8" (MINIMUM) PLYWOOD PANEL CUT TO SLIGHTLY UNDER OVERALL DIMENSIONS OF WINDOW OR DOOR RECESS
BLACK CLOTH EDGING MAKES TIGHT LIGHT-PROOF GASKET
HANDLE TO SUIT
PINE STRIPS NAILED TO PANEL PREVENT PLYWOOD FROM WARPING
HEAVY CLOTH STRIP
PRESS FIT BLACKOUT PANEL
7/16" X 1" PINE STRIP
LAY IN ORDINARY LINOLEUM CEMENT
BLACK CLOTH STRIP
7/16" PINE SPACER
TOP TRIM OF WINDOW FRAME
GROOVE OR SLIDE
CLOSING STRIP
3/4"
2"
PLYWOOD OR WALLBOARD
1/4" PINE
BLACK CLOTH ON INNER EDGE ONLY
END STOP
BLACK CLOTH
BLACK CLOTH ON TWO EDGES
SLIDE
GASKET
3/8" PLYWOOD PANEL
DETAIL OF SLIDES SCREW OR NAIL TO THE WINDOW FRAME
INSIDE WINDOW FRAME
SLIDING PANEL
SLIDING FIT BLACKOUT PANEL

BLACKOUT precautions are now mandatory in some defense areas, and authorities suggest that the kitchen be blacked out so that it will be entirely dark from without but light and cheerful inside.

This may be easily and cheaply accomplished by using plywood, strips of cloth, linoleum cement and a few commonplace household tools. Windows and doors in the kitchen will be effectively blacked out with either of the two types of panels shown here.

Measurements for press fit panels are made to fit inside of recesses in door and window frames and the material had best be cut to correct sizes on the job. Strips of thick black cloth one inch wide are cemented along edges of panels so that the cloth will form a light-tight gasket when the panels are fitted in place. Wood strips one inch wide nailed across panels prevent warping and provide convenient handles for a hurried blackout.



There's a thrill a minute racing a Moth, and they're inexpensive to build and own.

LITTLE MAE TOO, Moth Class Sailboat

by Roger Gintling

THE joy and pleasure of sailing can be more than doubled by racing your sailboat; that is, if you have a boat built for racing. The little boat described in this article will more than fill the desire for additional pleasures derived from water sports.

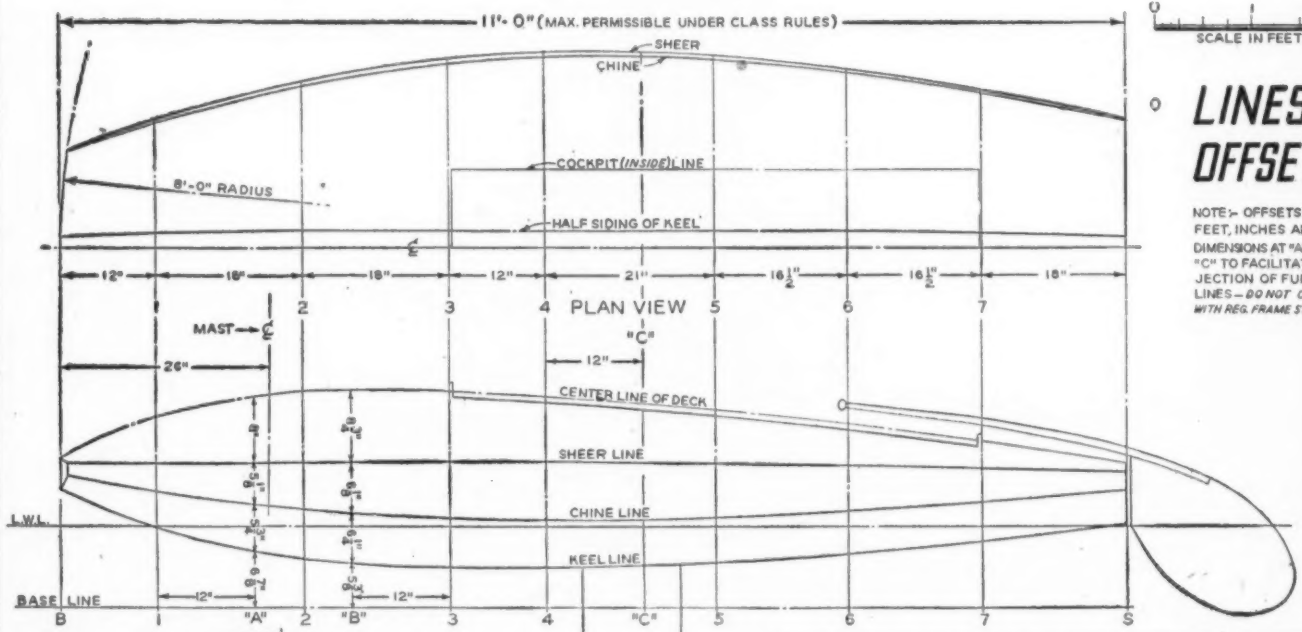
In general, there are two kinds of sailboat racing; class racing and handicap racing. Class racing is further divided into one-design and restricted classes. The Moth class is a restricted class, that is, while some of the sizes are restricted, the designer and builder are free to use their own ideas on the other dimensions. In the Moth class, the size and shape of the sail is restricted, but the hull can take any shape within eleven feet overall. The idea of this is to develop better hull forms, and as you travel around to regattas, you will see some queer ones.

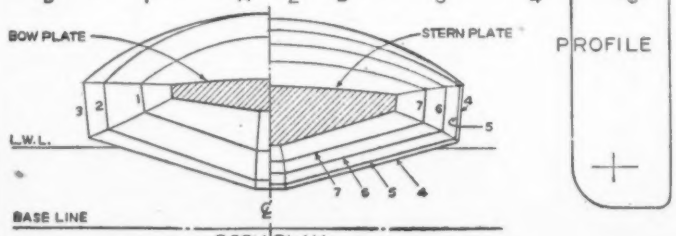
The rules as laid down by the International Moth Class Association are as follows:

1. Hull: Not more than 11 feet overall.
   Not more than one rudder.
   Not more than one center-board.
2. Construction: No restriction on design or construction.
3. Spars: All spars shall be straight.
   a. Mast: Not more than one. Length: Not more than 16½ feet above deck. Diameter: Not more than 3½ inches.
   b. Boom: Not more than one. Length: Not more than 9½ feet. Diameter: Not more than 3 inches.
   c. The angle of the mast and boom to be not more than 90 degrees.
   d. No restrictions shall be placed on weight of spars or rigging.
4. Sail:
   a. Not more than one. Height measured along

LINES & OFFSETS

NOTE:- OFFSETS ARE IN FEET, INCHES AND 8THS. DIMENSIONS AT "A", "B" & "C" TO FACILITATE PROJECTION OF FULL SIZE LINES — *DO NOT CONFUSE WITH REG. FRAME STATIONS.*





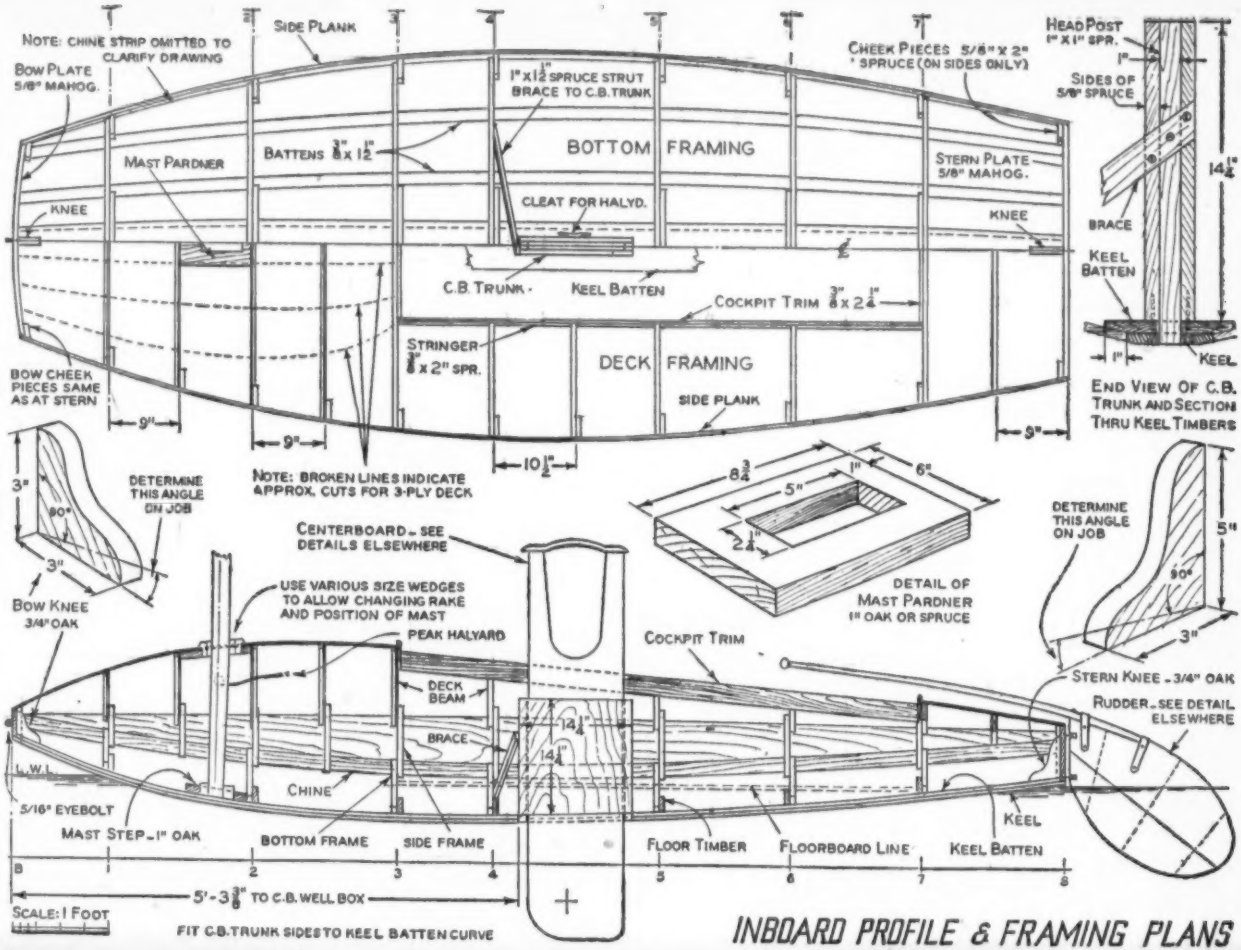
HEIGHTS ABOVE BASELINE

STATION	BOW	1	2	3	4	"C"	5	6	7	STERN
KEEL	1-2-4	0-9-5	0-5-7	0-4-7	0-4-7	0-5-1	0-5-4	0-6-5	0-8-1	0-10-1
CHINE	1-4-1	1-2-2	1-0-1	0-11-0	0-10-5	0-10-5	0-11-0	0-11-7	1-1-0	1-2-3
SHEER	1-5-5	1-5-6	1-5-6	1-5-7	1-5-7	1-5-6	1-5-5	1-5-3	1-5-1	1-4-4
DECK ℄	1-6-1	1-11-2	2-2-3	2-2-3	2-1-5	2-0-6	2-0-1	1-10-4	1-8-3	1-5-4

HALF BREADTHS FROM CENTERLINE

RABBET	0-1-2	0-1-5	0-2-0	0-2-0	0-2-0	0-2-0	0-2-0	0-2-0	0-1-7	0-1-3
CHINE	0-11-7	1-3-2	1-7-6	1-10-3	1-11-2	1-11-3	1-11-0	1-9-3	1-7-0	1-3-5
SHEER	1-0-0	1-3-5	1-8-3	1-11-0	1-11-7	2-0-0	1-11-5	1-9-7	1-7-3	1-3-7

TABLE OF OFFSETS NOTE: DIMENSIONS ARE TO OUTSIDE OF PLANKING



INBOARD PROFILE & FRAMING PLANS

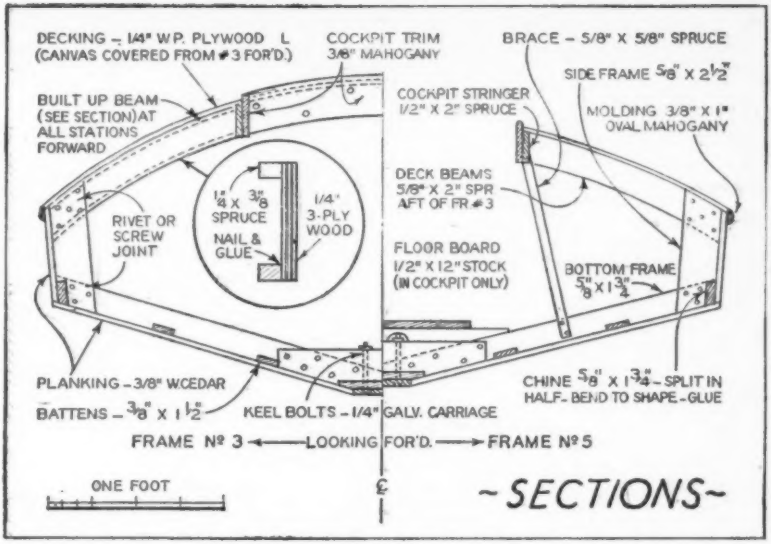
Framing is simple but strong. Set the center, or dagger board in muslin and marine glue to make it watertight.

mast, not more than 15 feet. Length measured along boom, not more than 9 feet. Leech: true round in leech to be not more than 6 inches, measured at the middle distance.

b. Sails shall be fastened to the boom permanently so that no part of the foot of the sail will be more than 3 inches from the boom.

c. Sails shall not be hoisted more than 16 feet from the deck.

d. The Moth emblem shall be placed (painted



The sections at right show two typical frames. These are assembled and fastened directly over the full-sized drawings previously made from the lines and offsets. Bevel them for the planking after setting them up on the building frame, or take bevels from drawings and trim before assembly.

or sewn) on both sides of each sail at a distance of about 18 inches from the top of the sail. The Moth emblem is designed thus: A perfect circle twelve inches in diameter. The circle itself is dark blue and the letter M is dark red. The width of the circle and the letter M is one and one-half inches.

e. Battens: Not more than four. Total lineal length not more than 92 inches. No batten within 6 inches of any spar.

f. Head Board: Not more than 4 inches in diameter measured at right angles to the mast.

g. Sails may be made of any material, and no restrictions shall be placed on the price or on the number of sails that can be owned by any one person.

h. Measurements taken from the apex of triangle.

While the foregoing rules are few, strict adherence should be paid to them. When completed, the boat should be registered with the Association. This can be done by writing to Mr. Selby Stokes, Secretary, International Moth Class Asso., c/o Pasquotank River Yacht Club, Elizabeth City, N. C.

Construction

The first thing to do when building any boat is to draw the lines full size on a floor on large sheets of stiff paper. This is necessary to obtain the correct angles for bevels and to correct for any inaccuracies in the offsets. The full sized body plan will also facilitate the building of the frames.

After laying down the profile and plan views from the offsets, the frame lines should be sketched in with a colored pencil. The *frame* body plan comes next, full size, and the frames can be built on this.

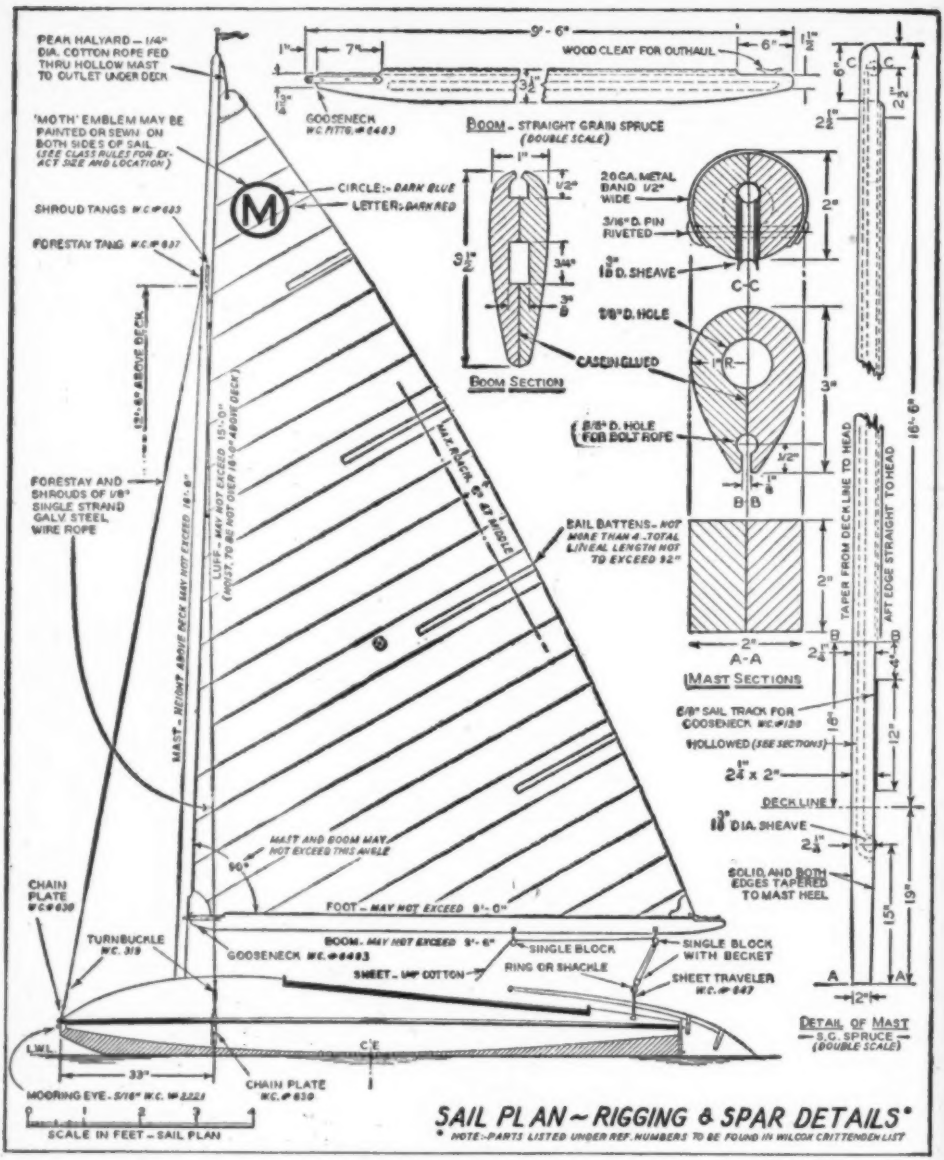
Order the lumber from the list given at the end of this article. The sizes indicated will be found ample. In any boat of this size, weight is a prime factor and this should be remembered in ordering the wood.

The first part of the actual construction should be the frames. Wide side frames are used to eliminate gussets at the chine. The bottom frames are fastened together by a floor piece, and in turn to the side frames by means of 8 d copper nails which are riveted over copper burrs.

Here it might be noted that where most builders use paint, in the construction of this particular boat a pot of casein glue was kept handy, and whenever two pieces of wood went together, both contacting faces were liberally coated with glue. This resulted in a most rigid boat.

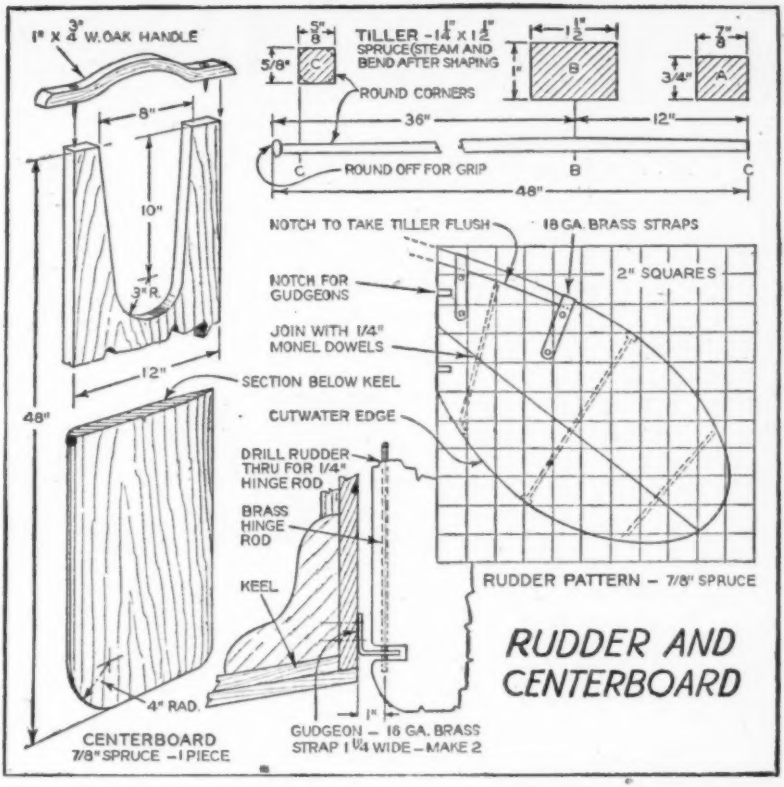
In building the frames, the pieces should be beveled before assembly, or enough should be allowed on the edges for beveling after assembly. Care should be taken to get the floors on the right side. The moulded line of the frame is the line between the floor and the frame pieces. The side frames should be left about 6" longer than the height at the sheer line to allow the frames to be set up on the building frame.

Almost all small boats are more easily built upside down, with both the bottom and sides being put on before turning over, and


PEAK HALYARD — 1/4" DIA. COTTON ROPE FED THRU HOLLOW MAST TO OUTLET UNDER DECK
'MOTH' EMBLEM MAY BE PAINTED OR SEWN ON BOTH SIDES OF SAIL (SEE CLASS RULES FOR EXACT SIZE AND LOCATION)
CIRCLE:- DARK BLUE
LETTER:- DARK RED
SHROUD TANGS W.C.# 603
FORESTAY TANG W.C.# 637
FORESTAY AND SHROUDS OF 1/8" SINGLE STRAND GALV. STEEL WIRE ROPE
MAST - HEIGHT ABOVE DECK MAY NOT EXCEED 18'-6"
LUFF - MAY NOT EXCEED 15'-0" (HOIST TO BE NOT OVER 18'-0" ABOVE DECK)
LUFF ROPE, 6 OZ. DUCK
BAIL BATTENS - NOT MORE THAN 4 - TOTAL LINEAL LENGTH NOT TO EXCEED 92"
MAST AND BOOM MAY NOT EXCEED THIS ANGLE
90°
FOOT - MAY NOT EXCEED 9'-0"
BOOM - MAY NOT EXCEED 9'-6"
GOOSENECK W.C.# 6403
SHEET - LINE COTTON
SINGLE BLOCK
RING OR SHACKLE
SINGLE BLOCK WITH BECKET
SHEET TRAVELER W.C.# 647
CHAIN PLATE W.C.# 630
TURNBUCKLE W.C. 319
MOORING EYE - 5/16" W.C. # 2223
C'E
LWL
33"
CHAIN PLATE W.C.# 630
SCALE IN FEET - SAIL PLAN
9'-6"
WOOD CLEAT FOR OUTHAUL
GOOSENECK W.C.# 6403
BOOM - STRAIGHT GRAIN SPRUCE (DOUBLE SCALE)
BOOM SECTION
20 GA. METAL BAND 1/2" WIDE
3/16" D. PIN RIVETED
9" 18 D. SHEAVE
5/8" D. HOLE
CASEIN GLUED
3/8" D. HOLE FOR BOLT ROPE
C-C
B-B
A-A
MAST SECTIONS
TAPER FROM DECK LINE TO HEAD
AFT EDGE STRAIGHT TO HEAD
16'-6"
5/8" SAIL TRACK FOR GOOSENECK W.C.# 120
HOLLOWED (SEE SECTIONS)
1" 24 x 2"
DECK LINE
3" 18 DIA. SHEAVE
SOLID, AND BOTH EDGES TAPERED TO MAST HEEL
DETAIL OF MAST
S.G. SPRUCE
(DOUBLE SCALE)
SAIL PLAN ~ RIGGING & SPAR DETAILS*
* NOTE:- PARTS LISTED UNDER REF. NUMBERS TO BE FOUND IN WILCOX CRITTENDEN LIST

Sail plan and mast details are given above. Do not change this rig or try to make the boat over in to a sloop.

Little Mae is no exception. Building a boat of this size without some kind of building frame is an invitation to trouble. A very good frame can be made by placing two pieces of 2"x4" about 12 ft. long parallel and on edge about 2 ft. apart. Across the ends of these nail a 12" board. The forward piece should be about 2' 4" long, while the after board, about 2' 8" long. Their centers should be even with the bow and stern. On top of the stringers nail a cross piece, also a 2"x4", at each frame; this should only be long enough to take the heads of the frames. Brace the whole framework diagonally, and if possible, secure it to the floor in a level position. With a chalk line mark a centerline on the end

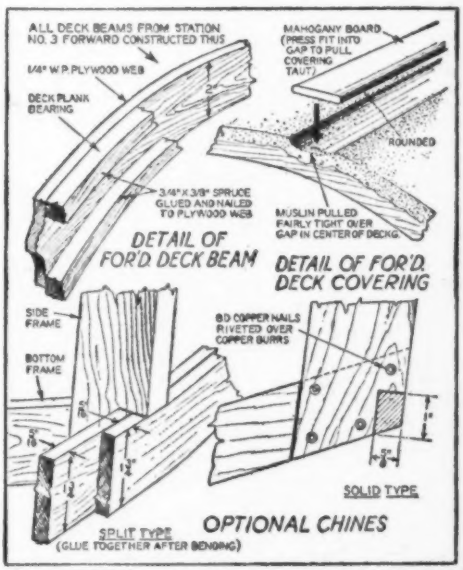


It is suggested that angle irons be used to reinforce the handle's attachment to the centerboard, as screws alone may pull out of the end grain. Wooden dowels set in glue or galvanized drift bolts can be used in the rudder instead of the monel fastenings indicated, if later are unobtainable.

boards and all the cross-frame pieces. Cut a piece of 2" thick wood to fit the inside curve of the stem plate and nail this securely to the forward crossboard in its proper place. Stretch a tight line directly over the centerline of the frame and at a proper height to serve as a base line.

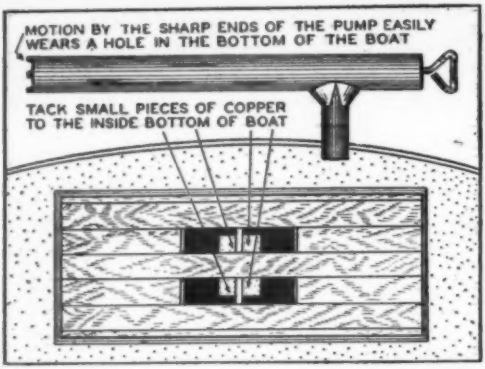
The frames should now be set up, using the taut string as a base line. The heads of the frames are fastened with one 1¼" screw to the cross pieces on the framework. With a plumb bob line, plumb the frame and secure it with a brace from the center of the floor timber to the next framework cross 2"x4". After the frames are in place, the bow and stern plates are fastened to their respective cross boards. A notch should be cut in the forward frame to take the bow knee. The bow and stern knees should be checked for angle by springing a light batten over the erected frames, and then securely fastened to the bow and stern with wood screws driven from the outside. These should be counter sunk for plugs. In making the bow and stern,

[*Continued on page 160*]


ALL DECK BEAMS FROM STATION NO. 3 FORWARD CONSTRUCTED THUS
1/4" W.P. PLYWOOD WEB
DECK PLANK BEARING
3/4" X 3/8" SPRUCE GLUED AND NAILED TO PLYWOOD WEB
DETAIL OF FOR'D. DECK BEAM
MAHOGANY BOARD (PRESS FIT INTO GAP TO PULL COVERING TAUT)
ROUNDED
MUSLIN PULLED FAIRLY TIGHT OVER GAP IN CENTER OF DECKS
DETAIL OF FOR'D. DECK COVERING
SIDE FRAME
BOTTOM FRAME
8D COPPER NAILS RIVETED OVER COPPER BURRS
SOLID TYPE
SPLIT TYPE (GLUE TOGETHER AFTER BENDING)
OPTIONAL CHINES

Chines, deck beams, and method of finishing off deck covering are shown in the sketch above.

Ideas For


MOTION BY THE SHARP ENDS OF THE PUMP EASILY WEARS A HOLE IN THE BOTTOM OF THE BOAT
TACK SMALL PIECES OF COPPER TO THE INSIDE BOTTOM OF BOAT

Bilge Pump Guard

WHEN a bilge pump is used repeatedly in the same spot in a boat, as is usually the case, the lower end of the pump is likely to damage the paint on the inside of the hull at that point. Small pieces of copper sheet tacked to the inside of the planking at the bilge pumping spot will protect the surface of the wood and the paint from damage.—*W. G. S.*

Bilge Keels For Your Boat

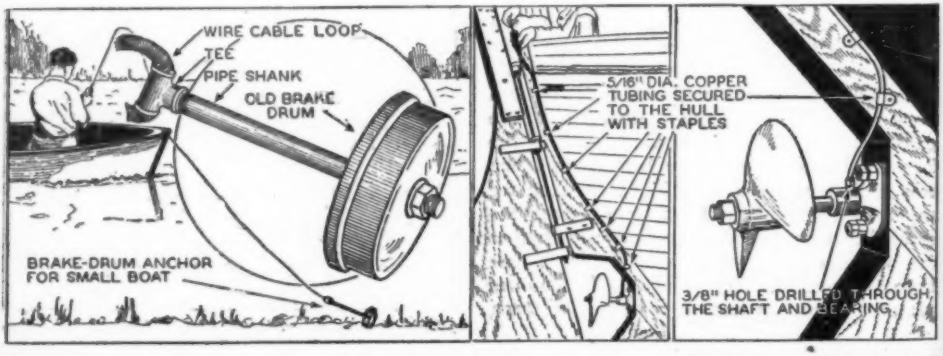
BILGE keels, or rolling keels, are easily attached to power boats, and eliminate much unpleasant rolling. Use galvanized carriage bolts as shown, with washers inside. A 30′ hull would take keels about 1¾″x3″ along the center third of the boat. Paint them well before tightening them in place.—*J. A. E.*

Anchor From Brake Drum

LIGHT boats may be anchored with this brakedrum anchor (below). A length of pipe forms the shank, and is held through the hub of the drum by a hexagonal nut on both sides. The pipe is, of course, threaded on that end to fit nut. Tee forms eye for rope.—*L. B. R.*

Propeller Greasing

THE underwater propeller shaft bearing will have a much longer life if lubricated occasionally while the boat is in use. This can be done without hauling out, by the method shown. Run a length of $\frac{5}{16}$″ tubing down the stern of the boat, and tap bearing bushing to take the attachment fitting. Use grease gun to pump grease into fitting on the deck. The tubing can be painted to match the hull and will be hardly visible.—*J. J. F.*

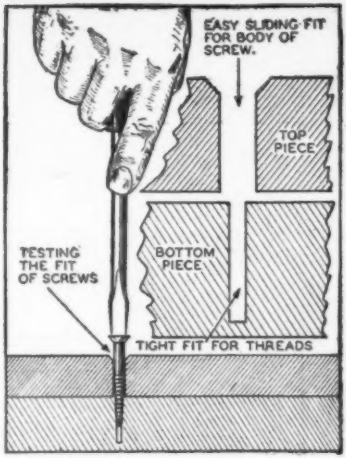

WIRE CABLE LOOP
TEE
PIPE SHANK
OLD BRAKE DRUM
BRAKE-DRUM ANCHOR FOR SMALL BOAT
5/16" DIA. COPPER TUBING SECURED TO THE HULL WITH STAPLES
3/8" HOLE DRILLED THROUGH THE SHAFT AND BEARING

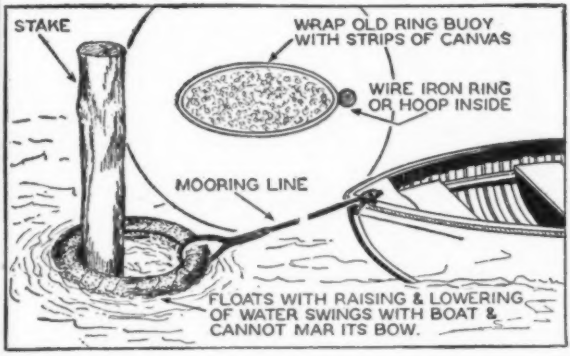
Boat Owners

Testing The Fit Of Screws

A BOAT builder who purchases several gross of expensive, different sized wood screws can save himself a lot of grief by doing some preliminary experimenting with drill sizes for the body and the root of each respective size of screw. Many charts containing such information have been published, but they are only very

[*Continued on page* 168]



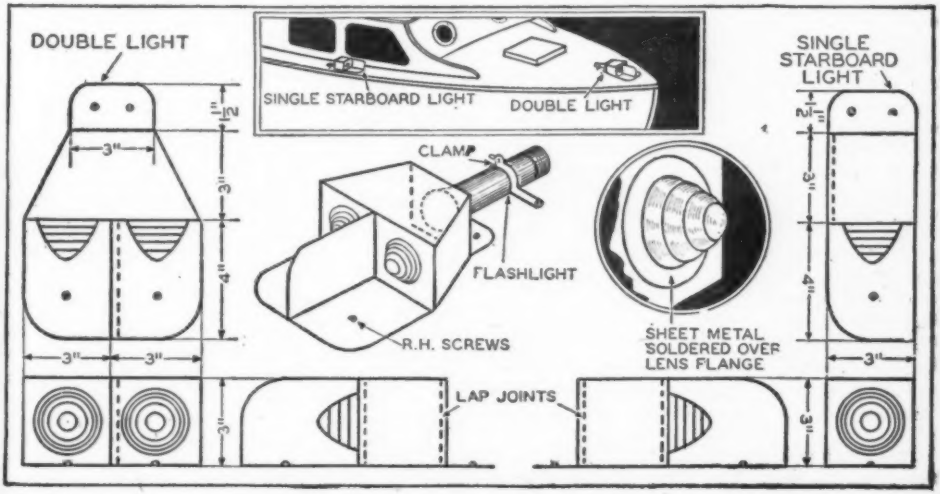

STAKE
WRAP OLD RING BUOY WITH STRIPS OF CANVAS
WIRE IRON RING OR HOOP INSIDE
MOORING LINE
FLOATS WITH RAISING & LOWERING OF WATER SWINGS WITH BOAT & CANNOT MAR ITS BOW.

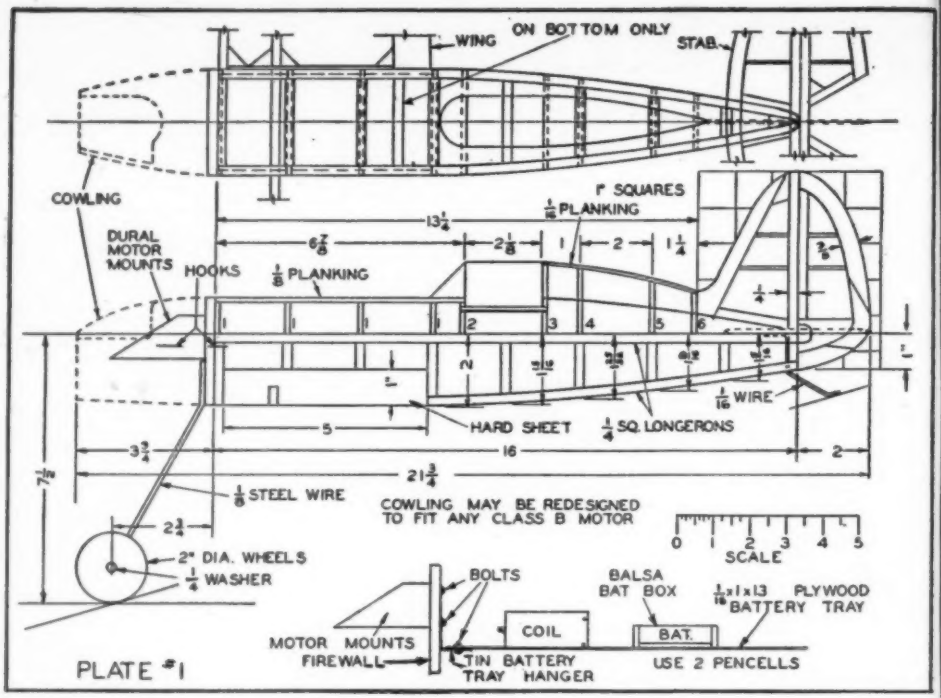
Tide Water Mooring Ring

A SMALL boat may be easily moored to a post in tide water areas as shown. An old cork ring type of life preserver is reinforced on the inside with a metal ring or small metal barrel hoop. The ring is then slipped over the post, and the mooring line fastened to it as shown.—*J. A. E.*

Make Your Own Running Light Units

ELECTRIC running lights for small boats may easily be made in separate units from inexpensive flashlights and sheet metal as shown. The metal is folded and soldered in shape after first making a paper pattern. Red and green lenses from truck clearance lights or similar auto lights are held in place by soldered flanges. Small red and green ribbed glass flower bowls also make excellent lenses. Flashlight clamps at back of both single and double types. —*J. B.*





Yellow Jacket

[*Continued from page* 111]

The tail assembly is made from ⅛-inch hard sheet balsa except for the ribs. They are 1/16-inch sheet.

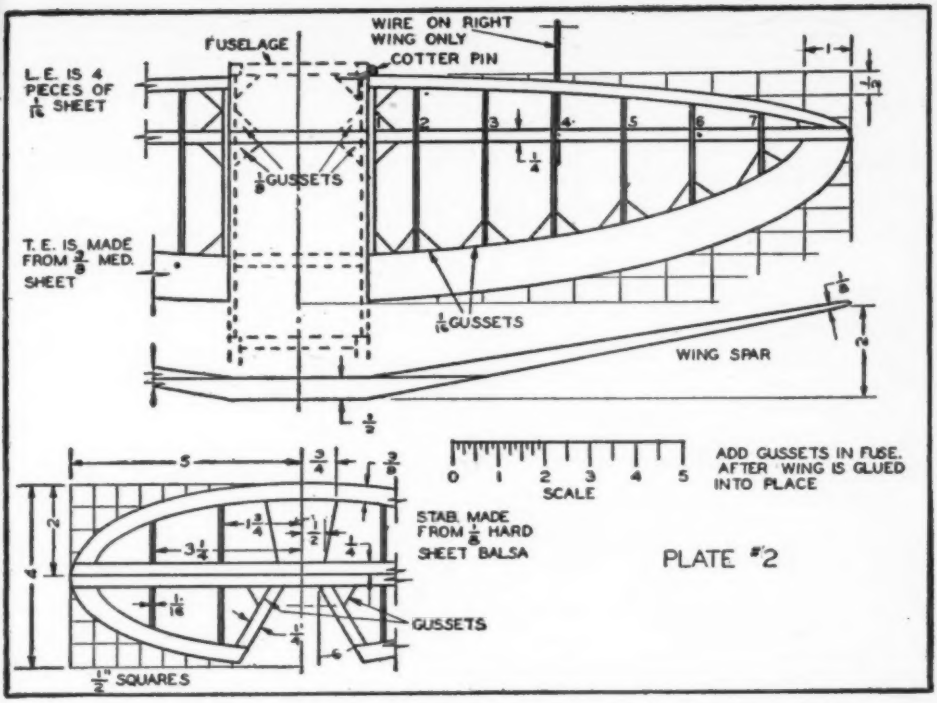
The wing is constructed in the usual manner. Make the spar first. Then pin one end of the spar, and the trailing edge of the corresponding panel into position. Add the ribs and gussets. Ribs and gussets are all of 1/16-inch balsa. When dry, remove that panel and rub the plan with liquid floor wax or fuel oil and then turn it over. Floor wax or fuel oil will make the plan transparent, thus you only have to draw one-half of the wing. Make the second panel the same as the first, with only the spar connecting the two. When completely dry, add the leading edge. This is done with 4 strips of 1/16-inch sheet balsa, wide enough to cover the butts of the ribs. Attach the first strip, pinning it at every rib, then glue it. When dry, remove the pins and rub glue along the outside of that strip and glue on the next one. Proceed in the same manner until all four strips are in place. Using rough sandpaper, round the leading edge and tips and bevel the trailing edge. Now glue the "G-Line" wire, or tether in place on the right wing.

The motor unit and landing gear are made as shown on the plan. The motor mounts may be bought at any model airplane store. Cut them off as shown so that they will fit into the cowling. Any Class B motor may be used, mounted upright. If the gas tank is removed, and a smaller one made, an Austin timer may be used; but it is not essential.

Make the cowling from four blocks of soft balsa. Cut them to shape and hollow them out. Glue the completed cowling to the firewall after the landing gear and motor mounts are in place.

To assemble the ship, glue on the vertical fin, and then slip the wing spar into the slot in the fuselage. Use plenty of glue. Line up the two root ribs so that the bottom of each rib is even with the bottom of the fuselage. Cover the whole ship with bamboo paper and give it at least three coats of clear dope and two of colored dope. More may be added if necessary. The original ship was yellow with blue trimmings and had a finish you could see your face in. This required five coats of clear dope, seven coats of yellow, and three of blue. Rub each coat of clear lightly with 240 dry sandpaper and each coat of color with 240 wet sandpaper. After the last coat of trim is on, rub the entire ship with 240 wet, then 400 wet, and then with fine rubbing compound. Finally, simonize the whole thing.

To attach the rudder and elevators, use a piece of tin about ½" square at each rib joint. With a razor, cut slits in the leading edge of the elevator and the trailing edge of the stabilizer and insert



Above: Wing and tail drawings. Below: Landing gear, motor mount, and tether wire attachment details. Ribs, bulkheads and fittings shown one-half size unless dimensioned. Reproduce full size and trace.

the tin squares into these slits. No glue is necessary. Do the same for the fin and rudder. These "hinges" may be procured from any discarded tin can.

Adjustments may easily be made by means of the tin "hinges" to improve the flight of the ship. Put the motor unit into place and hitch it with rubber bands.

Your ship is now ready to fly. Although, "Yellow Jacket" does not have movable controls like the models described in the article on page 66, with a little practice you'll be able to make her do most of the tricks performed by these more elaborate ships.

Large size blueprints are available for this plane at $1.50. Address Fawcett Publications, Greenwich, Conn., enclosing check or money order. Specify blueprint No. 329.

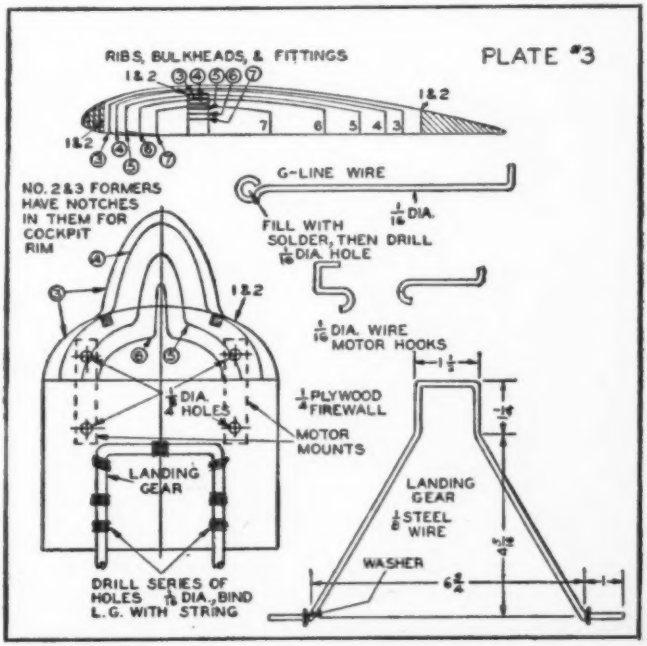
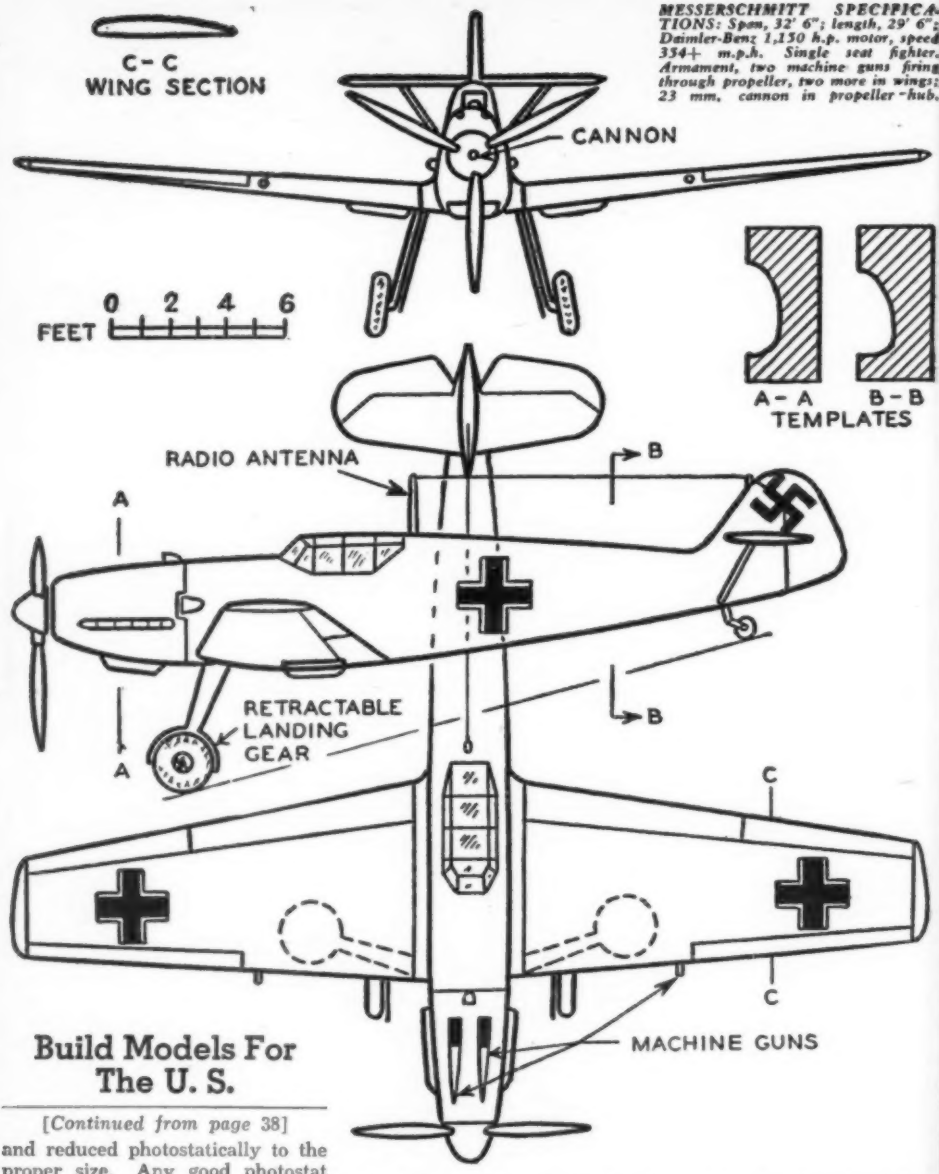


PLATE #3
RIBS, BULKHEADS, & FITTINGS
NO. 2 & 3 FORMERS HAVE NOTCHES IN THEM FOR COCKPIT RIM
G-LINE WIRE
1/16 DIA.
FILL WITH SOLDER, THEN DRILL 1/16 DIA. HOLE
1/16 DIA. WIRE MOTOR HOOKS
1/4 PLYWOOD FIREWALL
1/4 DIA. HOLES
MOTOR MOUNTS
LANDING GEAR
1/8 STEEL WIRE
WASHER
DRILL SERIES OF 1/16 DIA. HOLES, BIND L.G. WITH STRING


C-C
WING SECTION
MESSERSCHMITT SPECIFICATIONS: Span, 32' 6"; length, 29' 6"; Daimler-Benz 1,150 h.p. motor, speed 354+ m.p.h. Single seat fighter. Armament, two machine guns firing through propeller, two more in wings; 23 mm. cannon in propeller-hub.
CANNON
0 2 4 6
FEET
A-A B-B
TEMPLATES
RADIO ANTENNA
A
B
RETRACTABLE LANDING GEAR
C
MACHINE GUNS

Build Models For The U. S.

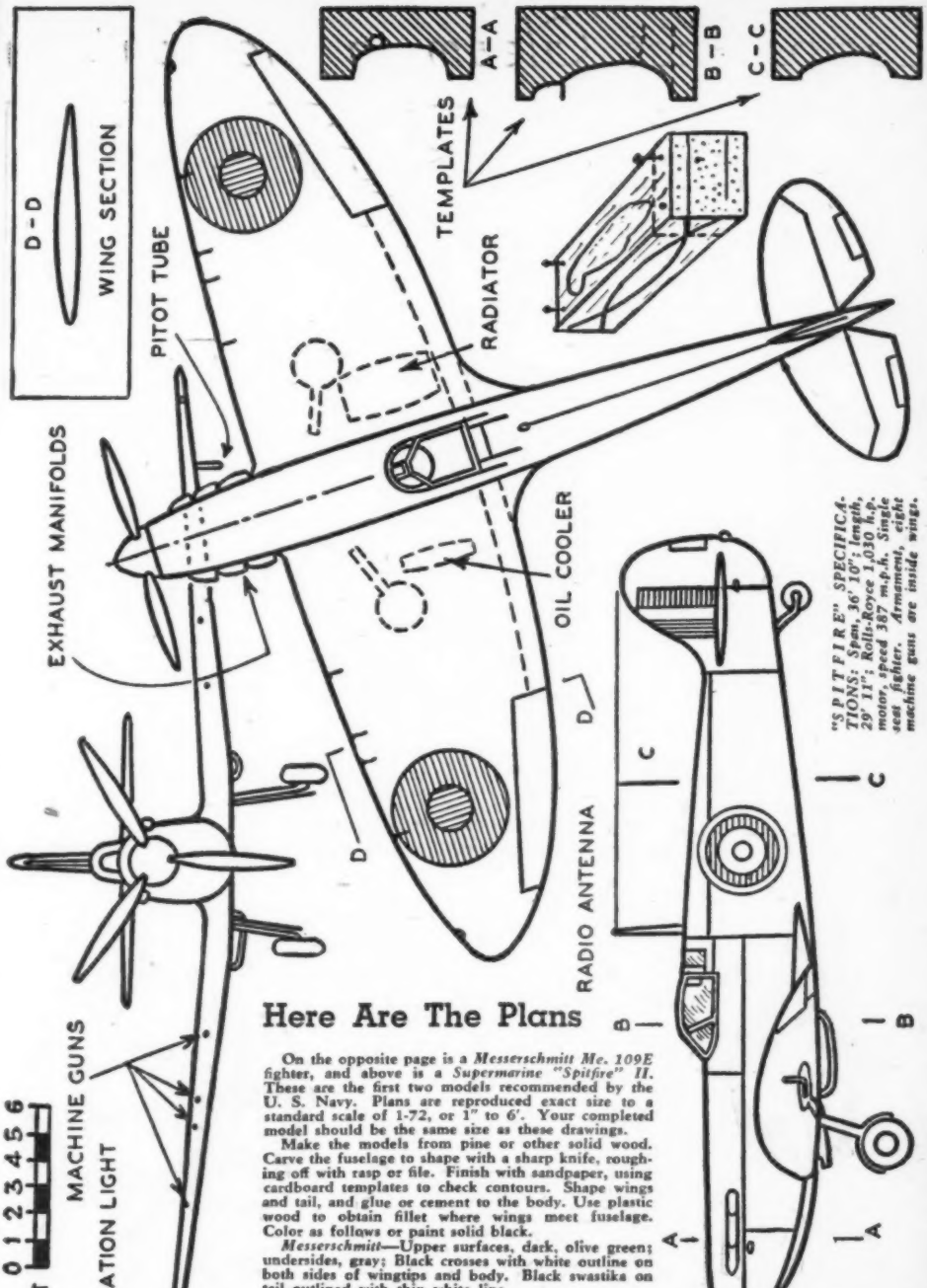
[*Continued from page* 38]

and reduced photostatically to the proper size. Any good photostat agency will do this at a nominal charge.

Army and Navy spokesmen commented on the fact that many air-minded boys who hang around airports are able to recognize and accurately name every airplane that comes in for a landing. No one seems to know just exactly how these youngsters do it, but it undoubtedly is a talent developed through constant observation of the general pattern of various types of plane. Navy officials are convinced that sailors and Air Raid Wardens can be made to develop the same talent through regular observation of these true-scale model planes.

So get to work right away! Sign your pledge and mail it to MI! Then start turning out models for Uncle Sam!

One word of warning, however: Do not mail your models to MECHANIX ILLUSTRATED. Go to the high school in your own locality and find the proper person to accept them.



"SPITFIRE" SPECIFICATIONS: Span, 36' 10"; length, 29' 11"; Rolls-Royce 1,030 h.p. motor, speed 387 m.p.h. Single seat fighter. Armament, eight machine guns are inside wings.

Here Are The Plans

On the opposite page is a *Messerschmitt Me. 109E* fighter, and above is a *Supermarine "Spitfire" II.* These are the first two models recommended by the U. S. Navy. Plans are reproduced exact size to a standard scale of 1-72, or 1" to 6'. Your completed model should be the same size as these drawings.

Make the models from pine or other solid wood. Carve the fuselage to shape with a sharp knife, roughing off with rasp or file. Finish with sandpaper, using cardboard templates to check contours. Shape wings and tail, and glue or cement to the body. Use plastic wood to obtain fillet where wings meet fuselage. Color as follows or paint solid black.

Messerschmitt—Upper surfaces, dark, olive green; undersides, gray; Black crosses with white outline on both sides of wingtips and body. Black swastika on tail outlined with thin white line.

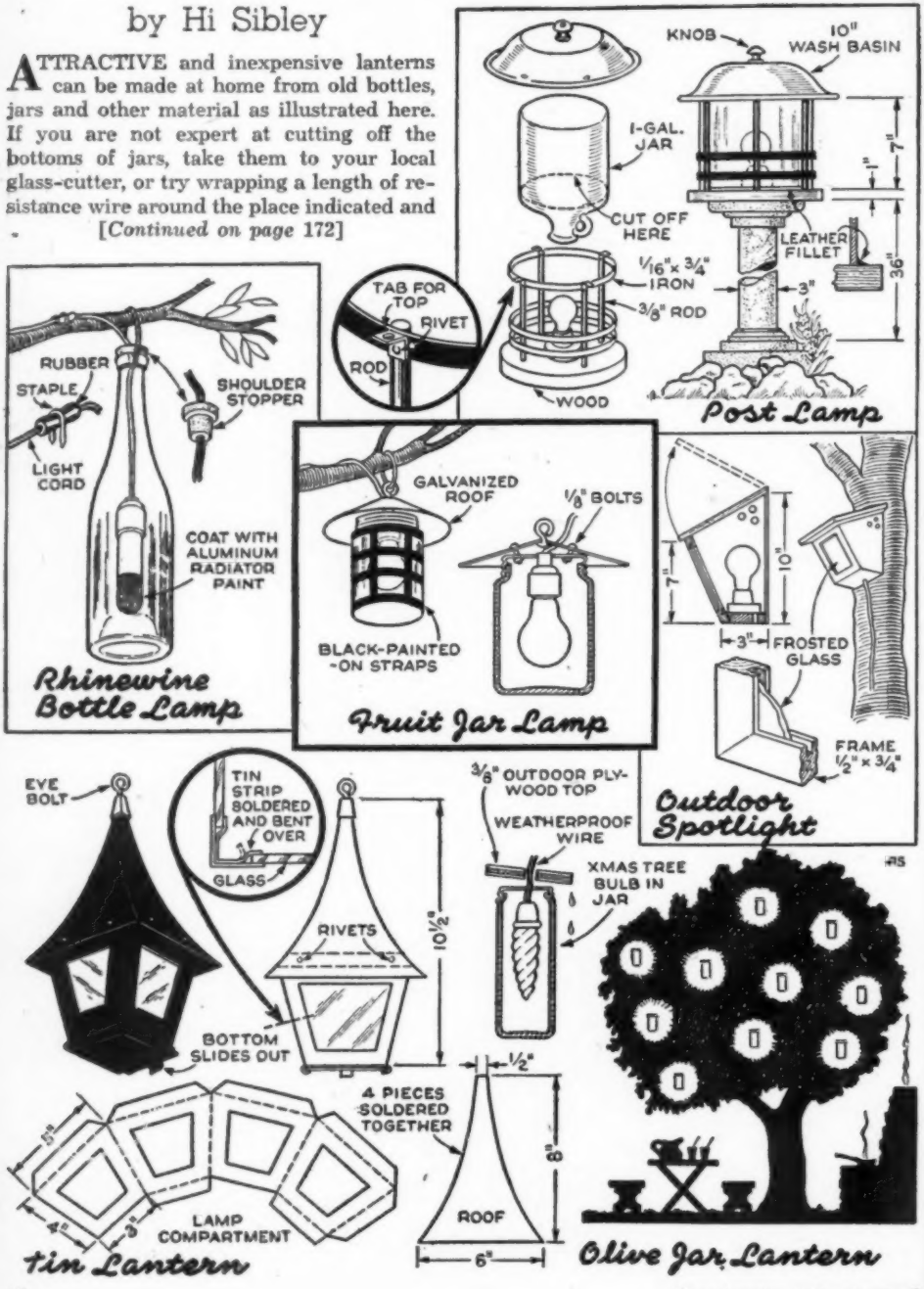
"Spitfire"—Upper surfaces, brown and green, camouflage style; undersides, silver or light blue. Bull's eyes on wings, blue with red centers; on body red center with white, blue and yellow rings; tail, red, white and blue stripes with blue aft.

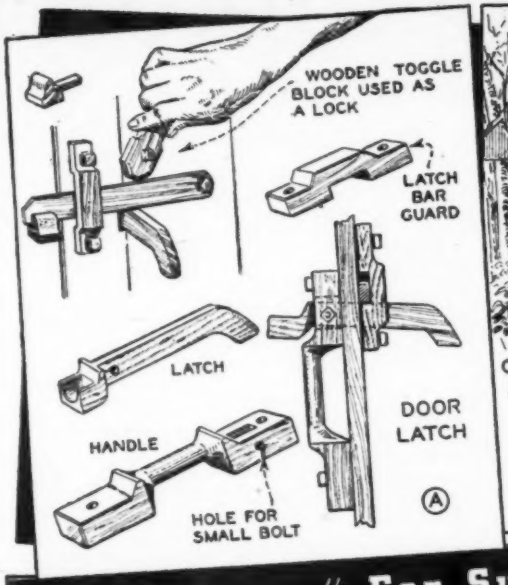
Lamps That Gleam in the Garden

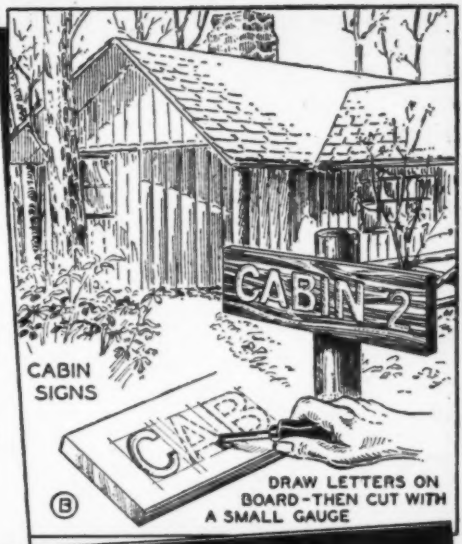
by Hi Sibley

ATTRACTIVE and inexpensive lanterns can be made at home from old bottles, jars and other material as illustrated here. If you are not expert at cutting off the bottoms of jars, take them to your local glass-cutter, or try wrapping a length of resistance wire around the place indicated and

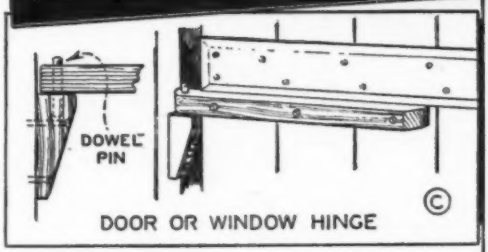
[*Continued on page* 172]

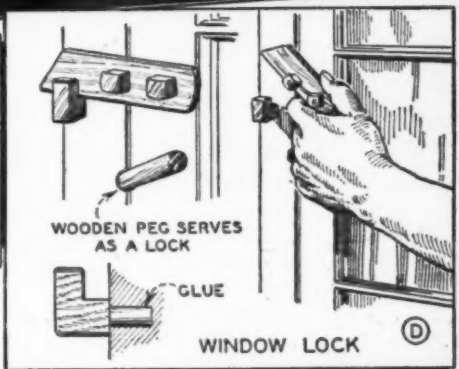


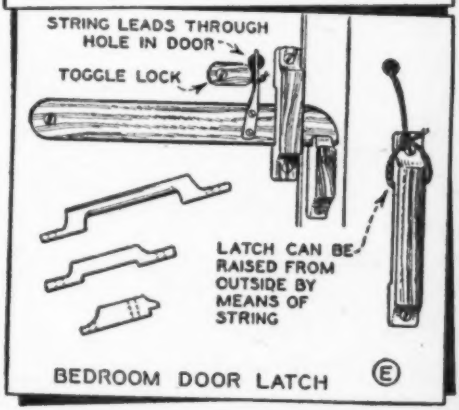




"Woodware" For Summer Cottages







DOOR and window latches and hinges fashioned from hardwood will add a distinct touch of originality to your summer cottage, and will at the same time provide fascinating workshop projects for spring evenings. The "woodware" shown here was carved by C.C.C. enrollees for use in log cabins at Virginia State Parks.

Only a few simple tools are needed to carve these articles, and they may be made any size, according to your requirements.

Almost any good wood which is free from knots will prove satisfactory for cabin hardware. Clear white pine is easily carved and will harmonize well with walls paneled in knotty pine. Oak, birch, or chestnut provide greater strength, though somewhat harder to carve. The grain of the wood should run lengthwise insofar as possible. In cabins

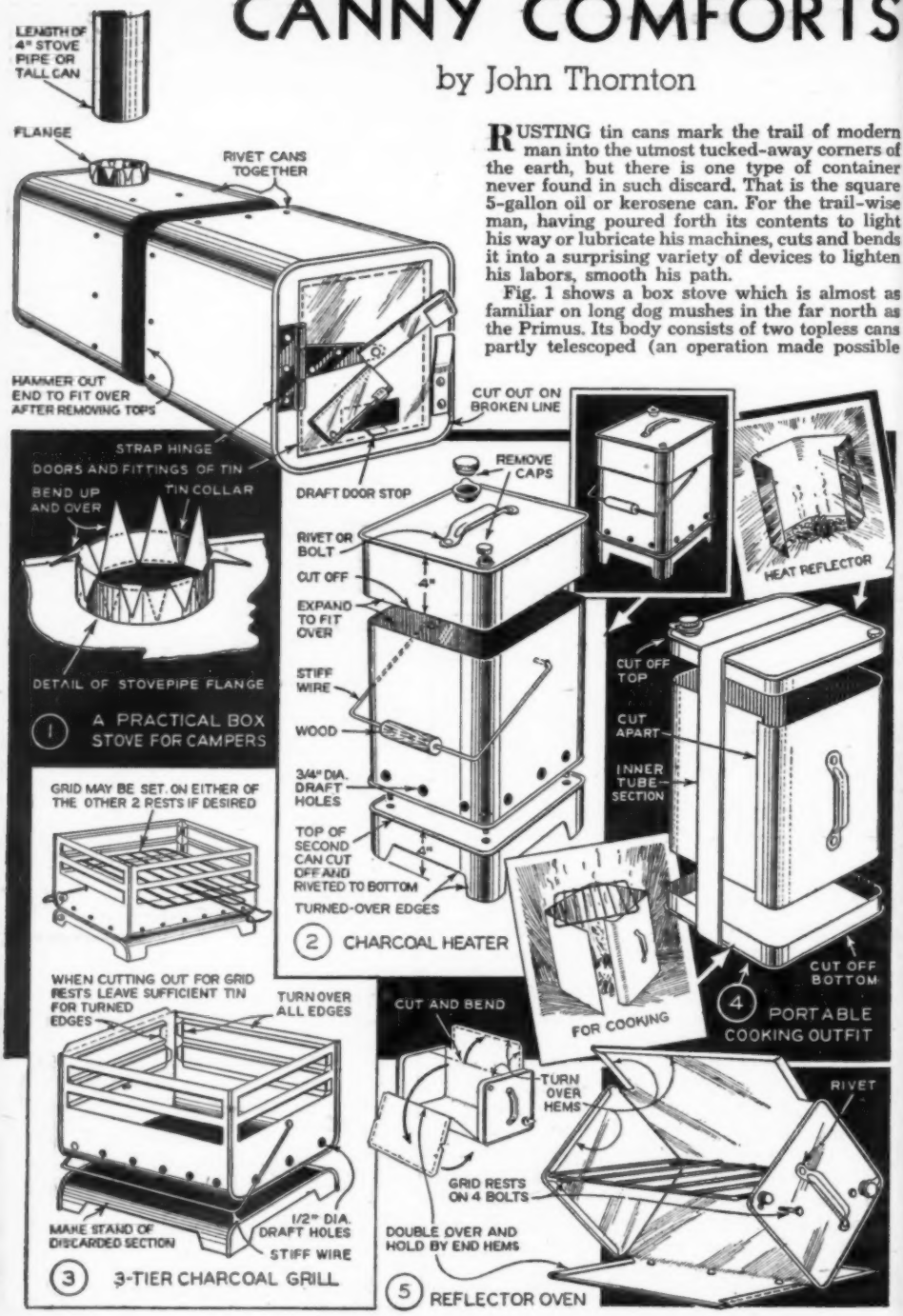
[*Continued on page* 176]

CANNY COMFORTS

by John Thornton

RUSTING tin cans mark the trail of modern man into the utmost tucked-away corners of the earth, but there is one type of container never found in such discard. That is the square 5-gallon oil or kerosene can. For the trail-wise man, having poured forth its contents to light his way or lubricate his machines, cuts and bends it into a surprising variety of devices to lighten his labors, smooth his path.

Fig. 1 shows a box stove which is almost as familiar on long dog mushes in the far north as the Primus. Its body consists of two topless cans partly telescoped (an operation made possible


LENGTH OF 4" STOVE PIPE OR TALL CAN
FLANGE
RIVET CANS TOGETHER
HAMMER OUT END TO FIT OVER AFTER REMOVING TOPS
CUT OUT ON BROKEN LINE
STRAP HINGE
DOORS AND FITTINGS OF TIN
BEND UP AND OVER
TIN COLLAR
DETAIL OF STOVEPIPE FLANGE
1 A PRACTICAL BOX STOVE FOR CAMPERS
DRAFT DOOR STOP
REMOVE CAPS
RIVET OR BOLT
CUT OFF
4"
EXPAND TO FIT OVER
STIFF WIRE
WOOD
3/4" DIA. DRAFT HOLES
TOP OF SECOND CAN CUT OFF AND RIVETED TO BOTTOM
TURNED-OVER EDGES
2 CHARCOAL HEATER
HEAT REFLECTOR
CUT OFF TOP
CUT APART
INNER TUBE SECTION
CUT OFF BOTTOM
FOR COOKING
4 PORTABLE COOKING OUTFIT
GRID MAY BE SET ON EITHER OF THE OTHER 2 RESTS IF DESIRED
WHEN CUTTING OUT FOR GRID RESTS LEAVE SUFFICIENT TIN FOR TURNED EDGES
TURN OVER ALL EDGES
MAKE STAND OF DISCARDED SECTION
1/2" DIA. DRAFT HOLES
STIFF WIRE
3 3-TIER CHARCOAL GRILL
CUT AND BEND
TURN OVER HEMS
RIVET
GRID RESTS ON 4 BOLTS
DOUBLE OVER AND HOLD BY END HEMS
5 REFLECTOR OVEN

FOR CAMPERS

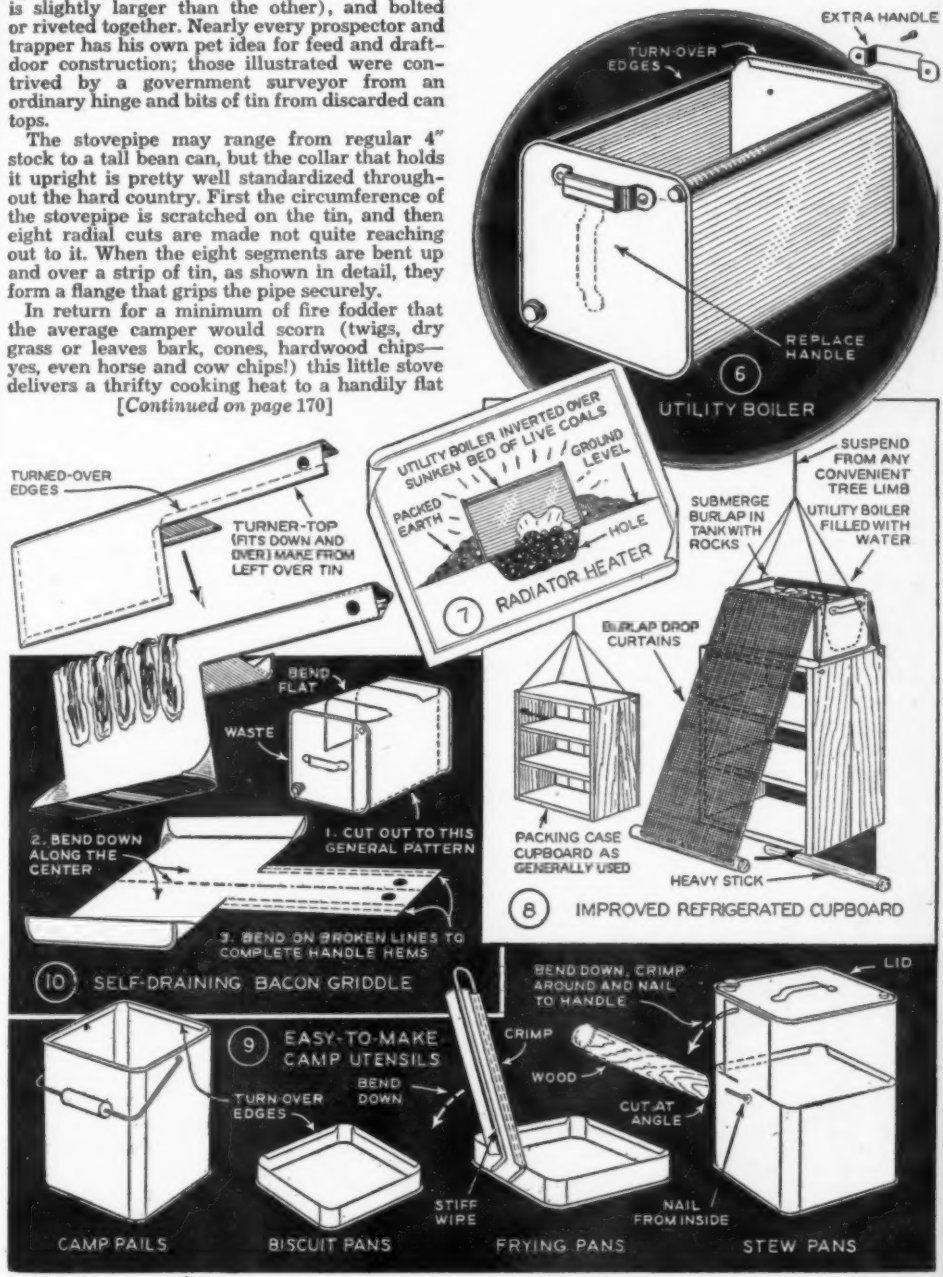
Handy devices that are left in that empty can—all "trail-tested!"

by hammering out the paneling on one until it is slightly larger than the other), and bolted or riveted together. Nearly every prospector and trapper has his own pet idea for feed and draft-door construction; those illustrated were contrived by a government surveyor from an ordinary hinge and bits of tin from discarded can tops.

The stovepipe may range from regular 4" stock to a tall bean can, but the collar that holds it upright is pretty well standardized throughout the hard country. First the circumference of the stovepipe is scratched on the tin, and then eight radial cuts are made not quite reaching out to it. When the eight segments are bent up and over a strip of tin, as shown in detail, they form a flange that grips the pipe securely.

In return for a minimum of fire fodder that the average camper would scorn (twigs, dry grass or leaves bark, cones, hardwood chips—yes, even horse and cow chips!) this little stove delivers a thrifty cooking heat to a handily flat

[*Continued on page* 170]



TACKLE-BOX GUN CASE

by Captain Robert Hertzberg

With the top tray in position, this might be just a tool box. The compartments accommodate rods, cleaning tips, fluid, small tools, patches, ammunition, etc.

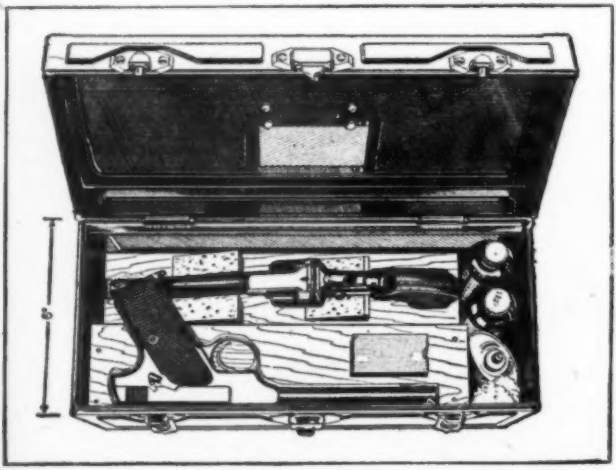
AN ORDINARY 98-cent tackle box, obtainable in practically any sporting goods or auto supply store, makes a very convenient and inconspicuous carrying case for the two standard hand guns of American target shooters, the .38 caliber Colt "Officers' Model" revolver and the .22 caliber "Woodsman" automatic pistol. The object in using this box is not economy, but camouflage.

Most of the fancy pistol cases made for gun cranks are of unusual shape or appearance and invariably invite attention and questions, but this modest and homely container passes merely for a tool box. Even when its cover is lifted the weapons still are not in sight. This particular outfit has attracted very favorable comment from shooters in several widely separated parts of the country, and many of them have made sketches of the rack element for adaptation to their own purposes.

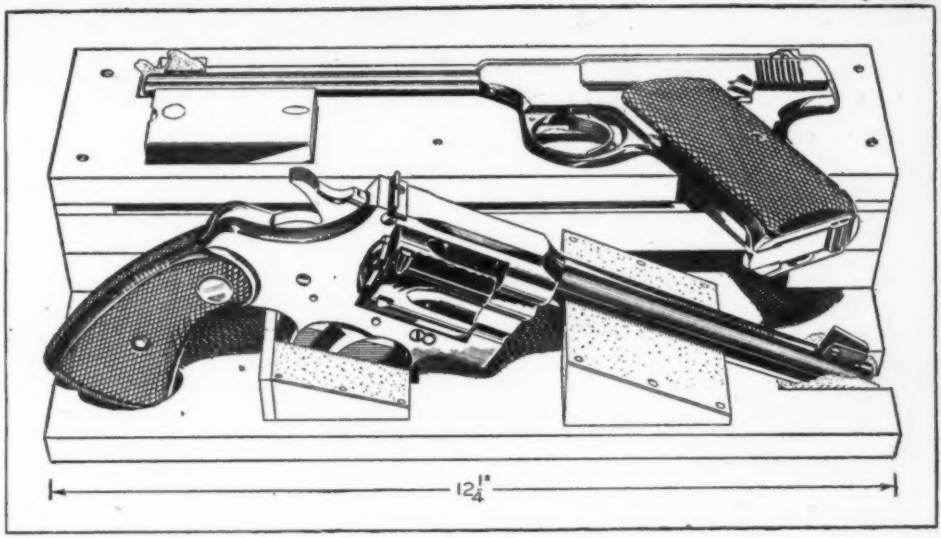
The main problem in the construction of any gun case is to support the weapons firmly, so that they won't rub off their expensive blueing, but at the same time to keep the points of contact to a minimum.

After considerable experimenting, the writer found that the arrangement shown in the drawings was the answer. This rack, built up of scrap lumber, sits snugly in the bottom of the tackle box, and the removable tray in turns rests over it without touching either gun.

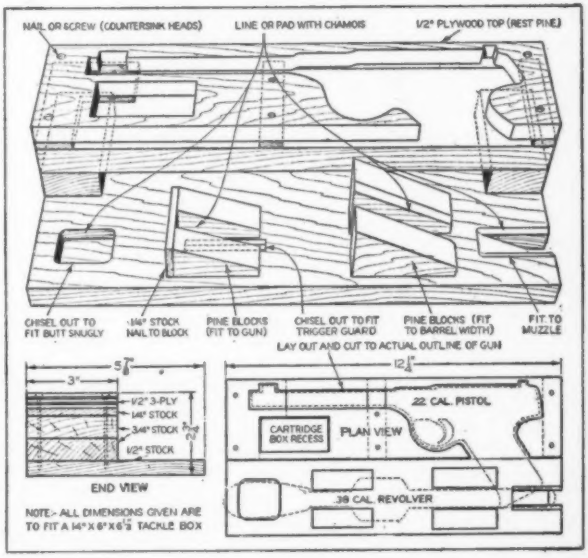
The .22 pistol rests in an opening of its own shape, cut in a piece of ½-inch plywood. A ¼-inch spacer in each corner raises this piece above the next lower section, so that gun is not quite flush with the uppermost surface. Since illustrations were made, the inside of the cut-out section has been lined with thin chamois (from a car-cleaning chamois), but ordinary patches served as protective



Left: Inside view of the gun case with top tray removed. No waste space here!



Above: This easily-made wooden rack holds the two guns firmly but leaves them accessible for quick removal. Note that the butt and muzzle of the revolver, in the foreground, rest in notches in the baseboard. Right: Details of rack and gun arrangement. Overall dimensions are, of course, subject to change, depending on the size of the available tackle box. The slanting upright blocks for the trigger guard and barrel are nailed in place with the actual gun as a guide.


NAIL OR SCREW (COUNTERSINK HEADS)
LINE OR PAD WITH CHAMOIS
1/2" PLYWOOD TOP (REST PINE)
CHISEL OUT TO FIT BUTT SNUGLY
.144" STOCK NAIL TO BLOCK
PINE BLOCKS (FIT TO GUN)
CHISEL OUT TO FIT TRIGGER GUARD
PINE BLOCKS (FIT TO BARREL WIDTH)
FIT TO MUZZLE
LAY OUT AND CUT TO ACTUAL OUTLINE OF GUN
5"
3"
1/2" 3-PLY
.144" STOCK
.344" STOCK
1/2" STOCK
END VIEW
12¼"
.22 CAL. PISTOL
CARTRIDGE BOX RECESS
PLAN VIEW
.38 CAL. REVOLVER
NOTE:- ALL DIMENSIONS GIVEN ARE TO FIT A 14" X 6" X 6½" TACKLE BOX

pads very satisfactorily for several months.

The revolver stands upright, and is kept from shifting by two pairs of wood blocks against the trigger guard and the base of the barrel respectively. Because of the limited space in the box, it was necessary to chisel out slots in the baseboard for the end of the barrel and the trigger guard, and to route out an oval-shaped depression for the butt. The hammer spur thus clears the bottom of the removable top tray by about $\frac{1}{16}$-inch, which is enough. The sides of the upright blocks are covered by double thicknesses of chamois, and the muzzle rests on a similar pad. An oblong hole was cut in the top section of the pistol board, to hold a box of .22 cartridges. There is room for two such holes, but the tray has sufficient capacity for all the ammunition likely to be used up in one day of shooting. The rack dimensions shown are based on a tackle box measuring 14 inches long, 6 inches wide and 6½ inches high. After being placed inside the box, the rack still leaves room for bottles or cans or cleaning compounds. Each gun can be removed without disturbing the other. The partitions of the tray (one long one and three short ones) are tailor-made for cleaning rods and boxes of cartridges.

When not in use, the whole ease can be stowed away safely in a filing cabinet, desk drawer or closet shelf.

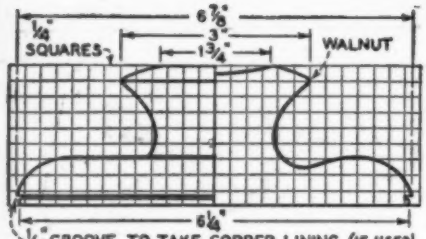
Lathe-Turned Cooky Barrel

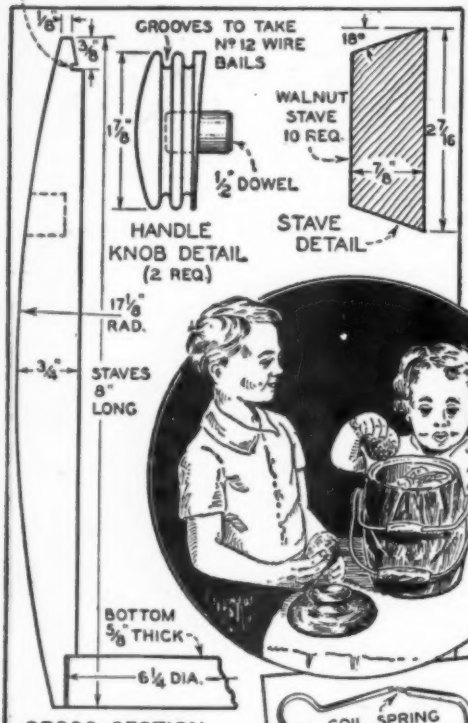
THIS modern adaptation of the cooky jar of long ago is a project worthy of any craftsman's skill and one that he can feel justly proud of having made. In time it might well become a priceless heirloom.

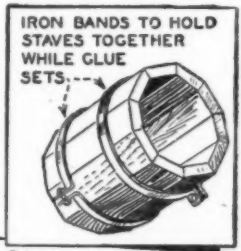
Cut ten staves from ⅞" walnut to the dimensions shown. Then dowel them together with ¼" dowels to form the barrel of the jar. Clamps made from iron bands will aid in obtaining a good tight glue job. (See detail.) Inside and outside turning of the barrel is comparatively easy if it is mounted in a jig, consisting of a maple stick and 2 disks, as shown. Turn a $\frac{1}{16}$" groove in the top inside edge of the barrel to take the flange of the lining. The beautiful high gloss finish is applied while the barrel is still in the lathe. Next turn the lid to the dimensions shown.

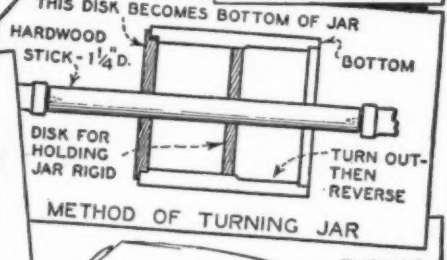
The lining cut to shape shown from copper has a 3/16" flange which should fit tightly when forced into the groove in the top edge of the barrel. The lining is inserted in the barrel then highly polished with fine sandpaper while the lathe is running at slow speed. The lining of the lid may be polished by hand. Now you are ready to turn the handle knobs which are attached to the

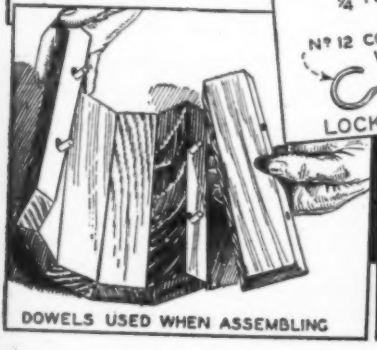
[*Continued on page 174*]








THIS DISK BECOMES BOTTOM OF JAR
HARDWOOD STICK - 1¼" D.
BOTTOM
DISK FOR HOLDING JAR RIGID
TURN OUT-THEN REVERSE
METHOD OF TURNING JAR



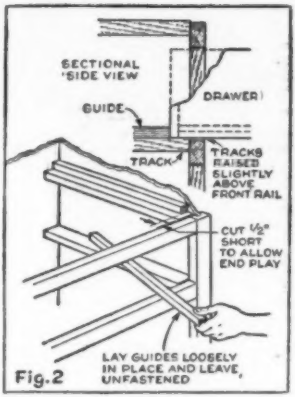


Fig. 2

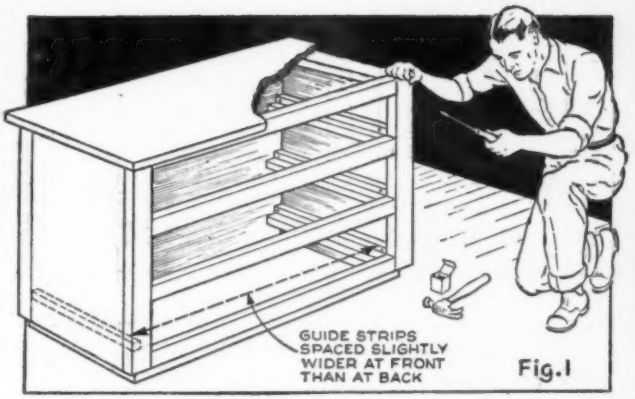


Fig. 1

Making Drawers Slide Easily

HERE are a few points to keep in mind when fitting and adjusting drawers.

An easy sliding action of a drawer can be insured in changeable weather, during which time the wood tends to swell with dampness and shrink with dryness, by installing guide strips that fan out slightly at the front as illustrated in Fig. 1. The added front clearance should be about ⅛" for an average size drawer.

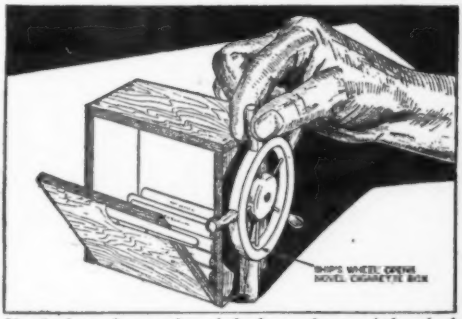
Another trick that successfully keeps a drawer sliding smoothly in damp as well as in dry weather is to leave the guides unfastened. For the purpose, cut them about ½" shorter than otherwise and simply lay them in place, as shown in Fig. 2. This leaves them free to adjust themselves to the movement of the drawer.

To avoid having a drawer jam when it is closed, raise the bottom track of the guides slightly above the front rail. Fig. 2. This adjustment will also prevent the drawer bottom from damaging the front rail.—*J. M.*

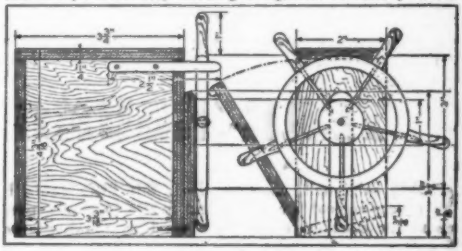
Ship's Wheel Opens Cigarette Box

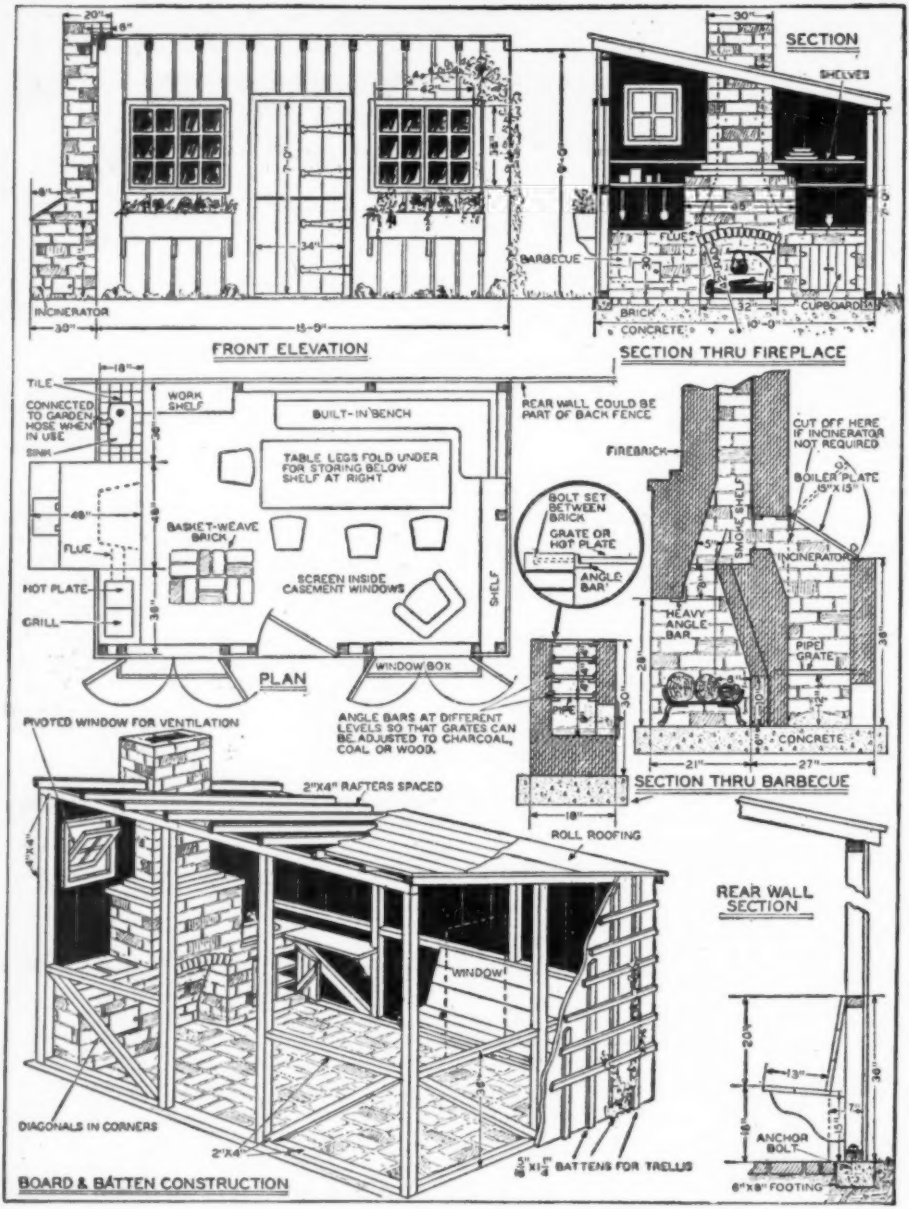
THIS attractive table box holds a large supply of either regular or king size cigarettes, and will appeal particularly to the boating enthusiast because of its marine design.

Use quarter-inch plywood or slightly thicker solid wood for its construction. The top, sides and back of the box are held together with Cascamite, or other strong glue. The front, which opens, is attached at the bottom with wood screw or dowel pivots driven through the sides into its edges. Slant the bottom so the cigarettes will slide forward toward the opening. A short strip of wood fastened to the front near the top acts as a catch for the wheel spokes. The wheel may be cut from plywood with a jig saw. Spokes are short pieces of stout wire, pointed on the ends by filing and anchored in the wooden hub of the wheel. Outer spoke ends, or handles, are whittled from a dowel.



Sketch above shows action of the box. A turn of the wheel and the front lowers, allowing a cigarette to slide forward.





YEAR-'ROUND SPORT SHACK

COME rain, hail, snow or sleet, this little cabin is a cozy retreat for family and guests to picnic, play games or cook up a complete meal on the barbecue fireplace. It occupies little ground space, and the back fence could be used for the rear wall. Construction is of the simplest and least expensive type, the board-and-batten design eliminating studs and permitting the

[*Continued on page 174*]

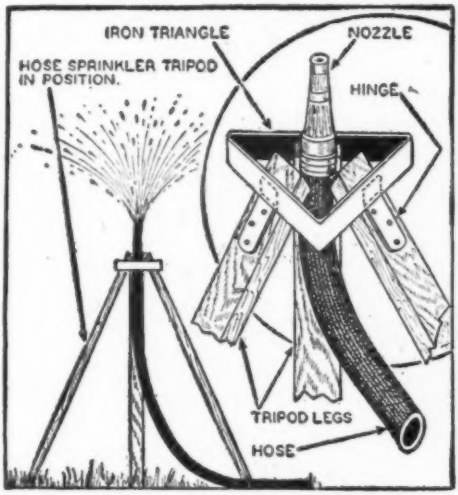
HINTS FOR THE HOME GARDENER

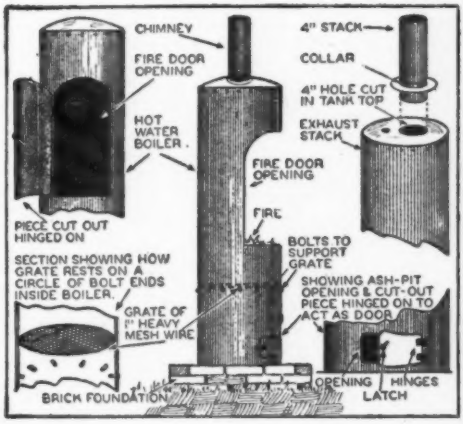
Runners On Garden Rake

IRON-TOOTHED rakes have an annoying habit of digging into the ground and catching wherever the slightest irregularity in the earth's surface occurs. This trouble can be overcome by bolting a pair of wooden runners to the outer teeth of the rake, as shown at right.—*A. H. W.*

Tripod Supports Hose

THE sketch below shows a unique way in which a common garden hose can be utilized as a lawn sprinkler in a portable supporting tripod.—*L. B. R.*





Garden Stove From Boiler

IF YOU want a combination incinerator and garden stove for summer luncheons, a good one can be made from a discarded hot water boiler.

Close any pipe openings with old plugs and drill and saw out a 4" hole in the top dome to include one of the top pipe openings. Into this hole can then be fitted a single length of 4" galvanized stove pipe. A collar about the lower

[*Continued on page 176*]

Protecting Young Trees

TARRED building paper, sawn up as in drawing at left and wrapped spirally around the trunks of young trees will protect them from insect pests and bumps.—*A. H. W.*

THE SCHOOL SHOP

Conducted by Frank Petraglia,
Shop Instructor, Samuel Gompers Industrial High School
New York City

School Shops In The War Effort

"Schoolboys Begin Making U. S. Arms."
—*N. Y. World Telegram.*

"500,000 Plane Models To Be Built in School Shops."—*N. Y. Sun.*

These two items are not figments of imagination. They are facts, straight from the newspapers. It's true; the school shops are "putting out" for the war effort. Educators and government officials are calling upon skilled boys and young men to enlist their mechanical abilities in the big war production job. And, are the boys responding! Well, those items are only a beginning. Just watch the papers from now on.

Yes, indeed, the school shops are in the fight. In Milwaukee "high school machine shop pupils went to work for Uncle Sam today," the news-item stated, "on production of 800 reverse bevel gear and primary feed shifts for milling machines, vital tools in fashioning modern weapons. The project, unique in the war effort, was given to the Milwaukee Trade and Technical High School." The news article, a half-column long, went on to describe how the parts had to be machined to an accuracy of one-half of one-thousandth of an inch. When the first steel shipment arrived, one group of boys cut it to size, another faced off ends and a third centered the cylindrical blocks and passed them to lathes for rough cutting. Then, finally came the grinding operations, the finishing to split-hair perfection.

But this is only half of this month's School Shop news. In a few thousands of school shops a veritable army of students are earnestly at work to fill a national production quota of one half million model planes for use by the Army and Navy. Don't be misled by the notion that these models are to be just a toy-making diversion. Indeed, no; they are to be employed for instruction purposes in the training of student airmen and civilian air-raid "spotters." (See article on page 35.) Hence, the models will be constructed exactly to scale and will require high standards of workmanship. This work will be done in industrial arts and vocational school classes under instructors' guidance. If you're a shop student you can appreciate what the tempo will be with everyone in the group doing his part in the team work.

Extending this work further, and perhaps stealing a page from the school-shop program, the OPM has called upon all home-workshop owners to register for war production, this in recognition of the fact that the great number of home-workshoppers represent vast reserves of manpower, skills, and equipment. Whether or not you are already doing war work in your shop classes, you should not fail to register your home workshop facilities. Send such information in to this department.

Your School Shop Department is glad that it was among the first to speak up for the willingness and ability of every shop student to participate actively in the national program. Last month, we directed attention to the pioneering action of those Chicago students who initiated the work of student production for the armed forces. We urged all manual arts students and home workshoppers to join in. But, school-shoppers need no special pleading. They've gone "all out" enthusiastically.

Don't despair if an assignment has not already reached your school. Quotas for the model-building project are on their way to every vocational

STUDENT'S PROBLEM BOX

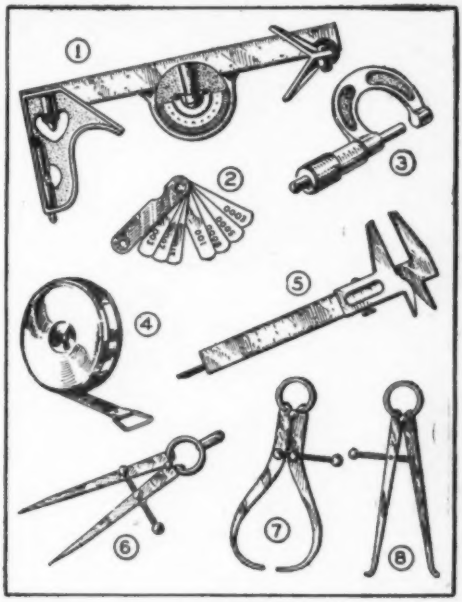
1. Q.—How may common nails be treated so that they will hold more firmly when subjected to great strain?
   A.—When nails are dipped in a solution of equal parts of rosin and benzol and allowed to dry they will grip more firmly.
2. Q.—How may paraffin be removed from inside a container?
   A.—To do a clean job of removing paraffin or wax, pour boiling water into the container and allow to cool. The paraffin or wax will float to the surface.
3. Q.—How may old motor oil be cleaned so that it may be used for other lubrication around the shop?
   A.—The following cleaning method may be slow, but it's effective. Place the used oil in a container on a shelf or box. Hang a rope over the edge, with one end of the rope in the oil and the other in a second container underneath. The oil will rise in the rope and run down into the lower container. Carbon and other impurities will be filtered out by the rope.
4. Q.—Often when driving a cotter pin through a tight fit the eye of the pin may be crushed or bent by the hammer. How can this be prevented?
   A.—Slip a nail through the eye, then hammer away. The nail will prevent crushing or bending.
5. Q.—How can you prevent a T-square from slipping on a drawing board?
   A.—The T-square may be held in place without undue finger strain by gluing a small piece of sandpaper on the blade close to the handle.
6. Q.—How may clippings be removed from scrapbooks without harm to the paper?
   A.—By inserting a sharp-pointed pencil between the pasted surface and the paper with a rolling motion, the clipping may be cleanly removed.
7. Q.—Is a special type of knife used for preparing cracks in walls and ceiling before plastering?
   A.—No. However, if you have a beer-can opener handy, the pointed end may be used for cutting and scraping. Wrap the handle with friction tape.

school in the country. Each school is expected to produce at least one set of fifty planes. You'll find the plans for the first two models recommended by the Navy on pages 128 and 129—a British "Spitfire" and a German Messerschmitt. Meanwhile, if there is a slip up anywhere, don't wait. Start your own production group. Remind your instructors to put equipment in readiness, and do the same with your own home workshop. Uncle Sam needs your skill.

Flashes From The School Reporter

YOUR chief SS reporter is glad to say that by next month the School Shop reporter staff will have passed the 100 mark. Well, that's a good beginning. If we keep up at this rate the editors of MI will have to give this little department a whole page to itself rather than tuck it away into this little corner . . . Thanks to all you fellows who have sent in those interesting reports on your shops. Wish we could publish them all just as written, or at least give the gist of them. But, with paper priorities and the usual space limitations, we've barely room to greet the new members for this month! So here they are, and welcome: Gardner Walker, Central Park H. S., Birmingham, Ala.; Edward I. Nannis, Lawrence H. S., Lawrence, Mass.; Marvin Sarafan, Spring Valley Trade School, N. Y.; George Loudon, Saunders H. S., Yonkers, N. Y.; Herbert Mailin, Essex County Voc. School, Bloomfield, N. J.; William Baisley, Southwestern, Jr. H. S., Battle Creek, Mich.; Eugenio Carrera, S. Gompers Voc., San Francisco, Calif.; Robert H. Anderson, Southern Trade School, Macon, Ga.; Albert Westerholdt, Daly Voc. H. S., Cincinnati, Ohio; Samuel Catalfani, Onandaga County H. S., Kenmore, N. Y.; Anthony Ruitolo, Cayuga County Central School, Cato, N. Y.; Henry Waller, Arthur Hill Trade, Wausau, Wis.; Wesley Schlagle, Riverside H. S., Ft. Worth, Texas. . . . These are the new additions to the class register. All present, and on the alert!

HOW MANY OF THESE MEASURING INSTRUMENTS CAN YOU IDENTIFY?



This month's craft test is of special interest because it deals with the tools of precision work—a necessity in producing war materials. Score 12½ points for each correct answer. *Turn to page 168 to see how you made out.*

THE SCHOOL SHOP NEEDS REPORTERS

If you would like to be a reporter for your shop group or school, just indicate this briefly on a postcard. Address MECHANIX ILLUSTRATED, 1501 B'way, New York, N. Y.

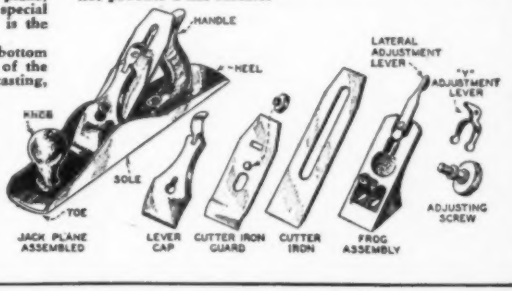
MI SHOP SCRAPBOOK INFORMATION SHEET

THE JACK PLANE

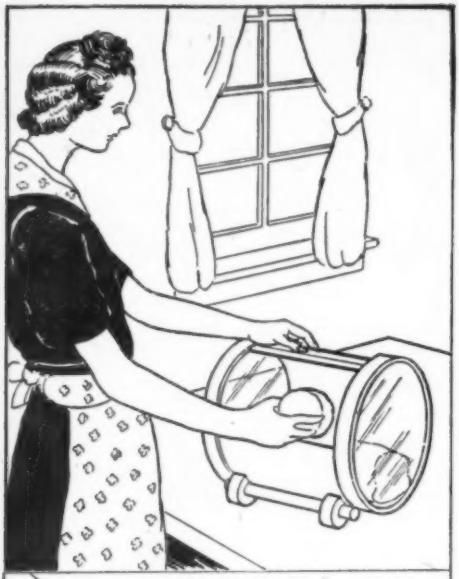
AMONG the many planes—the fore plane, the jointer, the smooth plane, the circular plane, the block plane, the bullnose rabbet plane, each adapted to some special purpose—the jack plane is the most versatile. It is the all-around plane.

The jack plane is usually about 15-in. long. The bottom of the plane is called the "sole." The front part of the sole is the "toe," the rear part the "heel." A casting, called the "frog" is screwed to the iron body near its center. The illustration shows the component parts, all of which are present in the various types of planes. The plane iron consists of the cutter and the cap, the latter being screwed to the back of the cutter and is used to stiffen it and to break up the shavings. The plane iron is clamped to the frog by means of the "lever cap." The "Y adjustment" screw adjusts the plane iron to the depth of the cut. The plane iron can be adjusted laterally or level with the sole of the plane, by a lever riveted to the top of the frog.

When planing, the entire sole of the plane should be in contact with the wood to produce a straight edge. The beginner's tendency to hold the plane obliquely should be avoided. Oblique cutting is a little easier but it does not produce a flat surface.



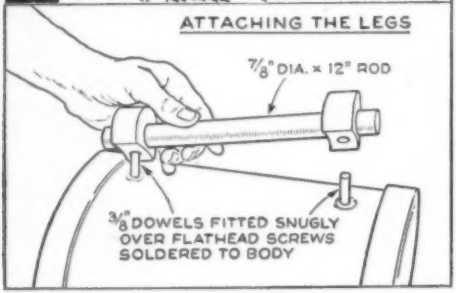
"X-RAY" Bread Box

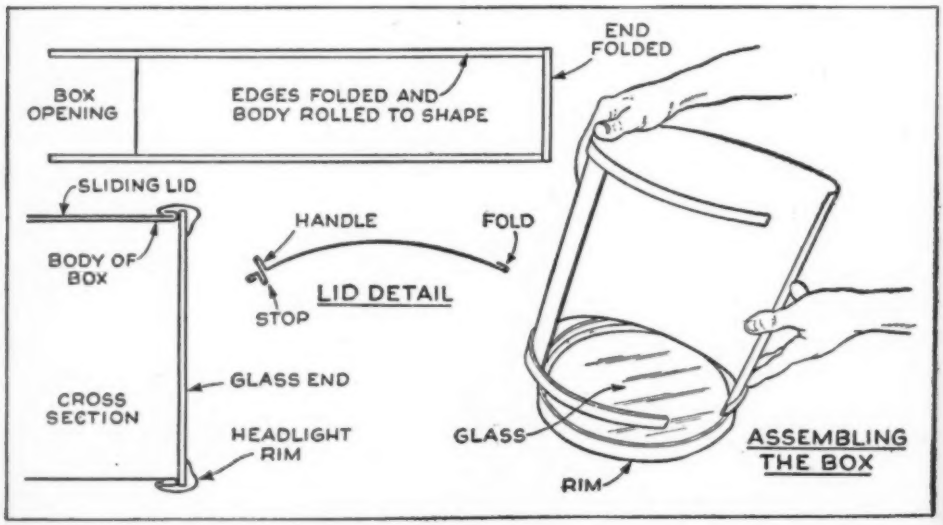


YOU can see at a glance the contents of this modern-looking "X-Ray" bread box, which utilizes scrap automobile headlight rims in the ends. Although it can be constructed at small cost it will add an up-to-date note to any kitchen.

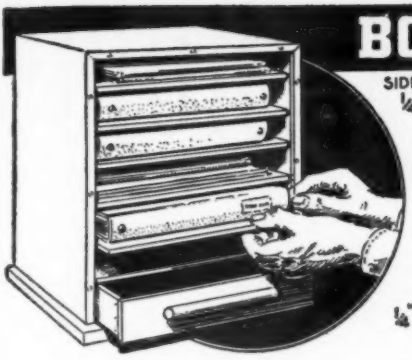
Double strength glass, cut to fit exactly, should be substituted for the lenses in the rims. The box itself may be made from any scrap sheet metal. A couple of old 2-gallon oil cans will provide the material. Cut a piece 12" wide and the proper length (solder two lengths, if necessary) to reach around the inside of the headlight rims used. The edges are folded over, as shown. These folded edges should be measured accurately so that when the cylinder is inserted it engages the rolled edge of the headlight rim, holding the glass in place and locking the two parts together. The sliding lid is made and inserted in the slides before the box is assembled, then the folded edges, which form the lid slide, are soldered together.

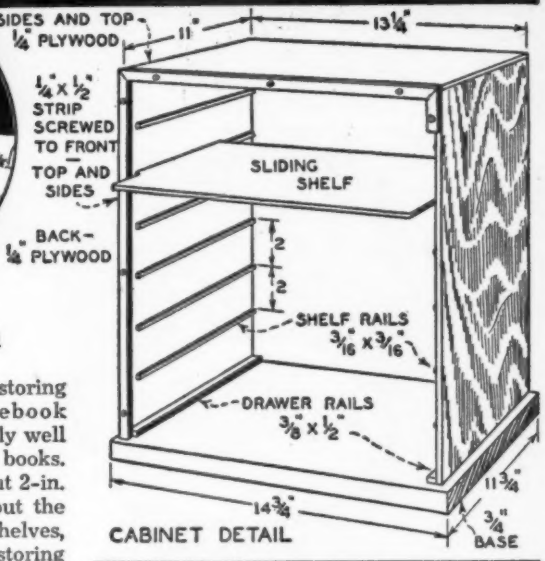
For the legs turn 4 rings from 1⅛" maple, making the outside diameter 2¾" and the inside diameter ⅞". Then turn 2 sticks ⅞" in diameter and 12" long. Jigsaw a curved section from each ring to fit the body of box.





BOOKLET CABINET





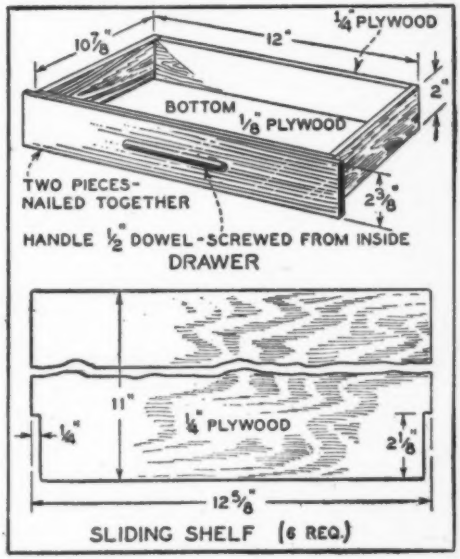
CABINET DETAIL

by Walter E. Burton

ORIGINALLY designed for storing 8½-in.x11-in. loose-leaf notebook binders, this cabinet can be used equally well for magazines, booklets, and other thin books. Each of the shelves slides forward about 2-in. so a notebook can be extracted without the aid of a boat hook. In addition to the shelves, there is a drawer at the bottom for storing notebook fillers, loose sheets, pencils, etc.

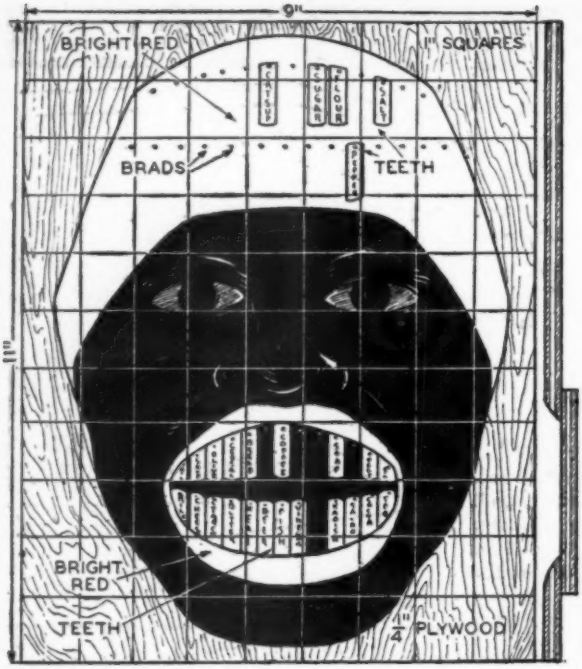
The cabinet can be any height, depending on the quantity of material to be stored. It is constructed throughout of quarter-inch plywood or similar material, except the back which need be only ⅛-in. thick, and the ¾-in. base. Each shelf measures 11-in. wide by 12⅝-in. long, and is notched for a distance of about 2⅛-in. back from each front corner. Strips ¼-in. thick and ½-in. wide, forming a frame around the front edges of the sides and top, act as stops to prevent the shelves from being pulled all the way out. The cabinet sides are 11-in. wide and are rabbeted to receive a ⅛-in. back. Across the inside surfaces of the sides are fastened strips about 3/16-in. square on which the shelves slide. Center-to-center distance between strips is 2-in. The base is made of ¾-in. material and extends for about ½-in. at the sides and front. The drawer is dimensioned to slide freely in its compartment which measures 2⅜-in. high, 12¼-in. wide (between front strips), and 11-in. deep. A 7-in. length of ½-in. dowel rod fastened to the drawer front with two wood screws serves as a handle.

In order to make it possible to remove shelves if it ever becomes necessary, one (or both) of the front strips is fastened to the side piece with three small, countersunk wood screws. When painted the same color as the wood, these screws are scarcely noticeable.



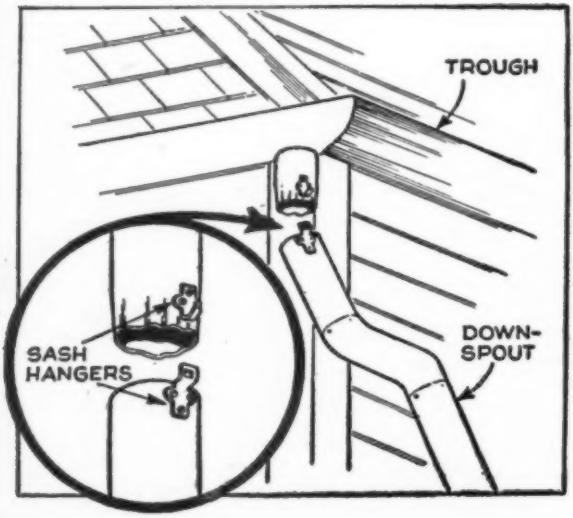
Rejuvenating Typewriter Ribbon

STRETCH the worn ribbon between two supports, like a clothes line. Saturate a dab of cotton with light lubricating oil and run it lightly over the ribbon. Do not press too heavily, or the ink in the ribbon will run. Now roll the ribbon back on its spool and let stand overnight. When put back it will work like new.—*W. K.*



Downspout Quickly Removed

THE downspouts of eaves troughs are easily clogged with sparrow nests or leaves, which cause the water to flow over the top. If the spout is soldered it is difficult to clean. To facilitate removal of the downspout for cleaning, rivet or bolt the two sections of a sash hanger to the spouts as shown below.—*E. H.*



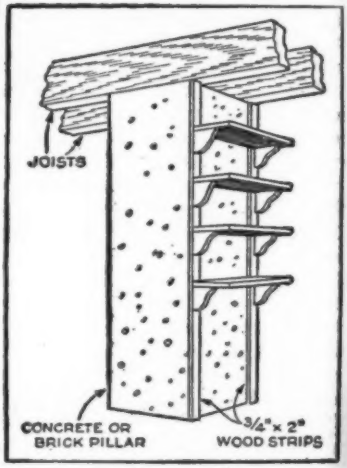
HOME

Kitchen "Reminder" Aids Ordering

THIS novel kitchen reminder answers its purpose and at the same time makes an amusing appearance. The labeled teeth are removable and when an item is needed a tooth is moved from the mouth to a hole provided for the purpose in the bandanna.

The figure is first drawn on a piece of ¼" plywood 9"x11". After the rough sketch of the figure is drawn on the board, the mouth is cut out with a jig saw. The teeth are fashioned from ¼" square stock.

[*Continued on page* 168]



Basement Shelves

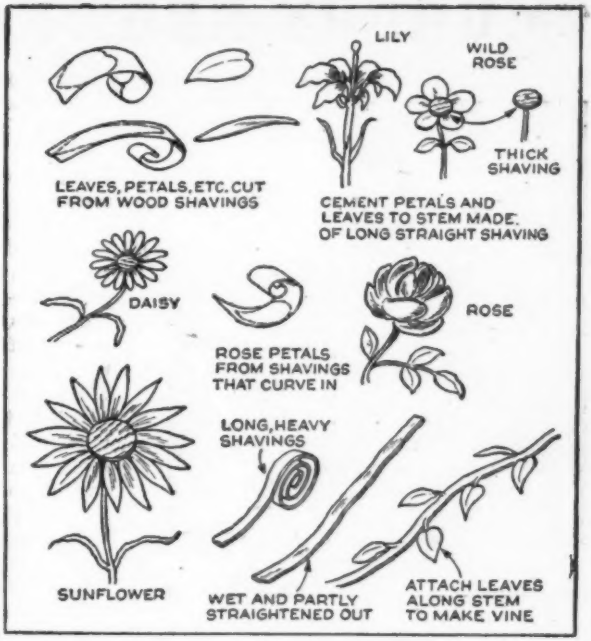
HANDY shelves that any boy who can use simple tools will be able to make can be constructed on either one or two sides of brick or concrete block support pillars found in basements of most homes.

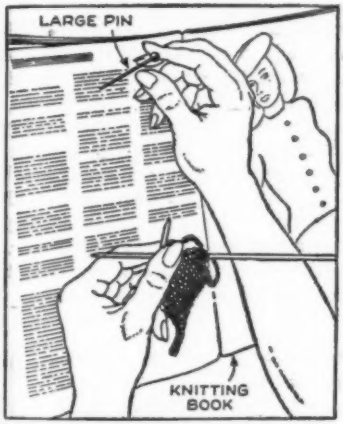
Two wood strips ¾"x2" are fastened one to each side, the height of the pillar. Wooden shelves, supported by wood or metal brackets, are secured to the strips.—*J. E. M.*

AIDS

Wooden Flowers From Shavings

ATTRACTIVE and realistic artificial flowers can be made with the wood shavings which curl out of planes and other workshop tools. A pair of sharp shears, razor blade and cement are all the equipment needed. By selecting shavings with a natural resemblance to the intended flower, best results will be obtained. Color with oil paints.—*A. H. W.*


LILY
WILD ROSE
THICK SHAVING
LEAVES, PETALS, ETC. CUT FROM WOOD SHAVINGS
CEMENT PETALS AND LEAVES TO STEM MADE OF LONG STRAIGHT SHAVING
DAISY
ROSE
ROSE PETALS FROM SHAVINGS THAT CURVE IN
LONG, HEAVY SHAVINGS
SUNFLOWER
WET AND PARTLY STRAIGHTENED OUT
ATTACH LEAVES ALONG STEM TO MAKE VINE

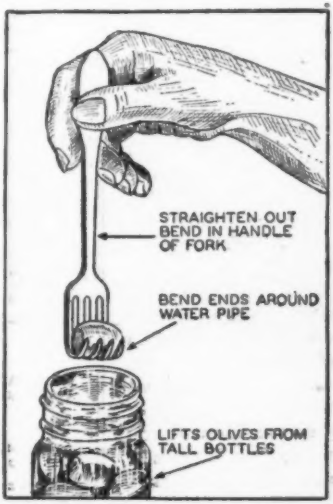


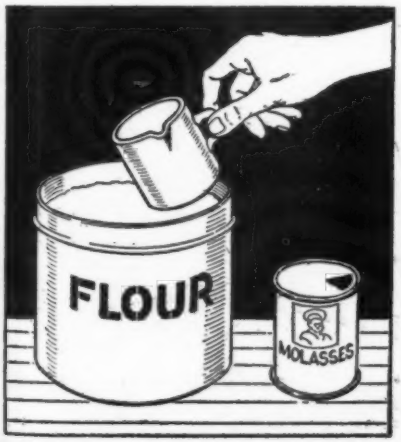
Knitting Direction Marker

WHILE knitting or crocheting it is annoying and tiring to keep looking for your place when following lengthy directions. Stick a corsage pin, or a large darkhead pin into the paper to keep your place, moving the pin along as you work.—*B. N.*

Olive Fork

THE nerve-wracking job of getting the olives out of the bottle can be simplified with an ordinary table fork altered as shown below. The bent tines get under the elusive critters and bring them to the surface in abject surrender.—*A. H. W.*

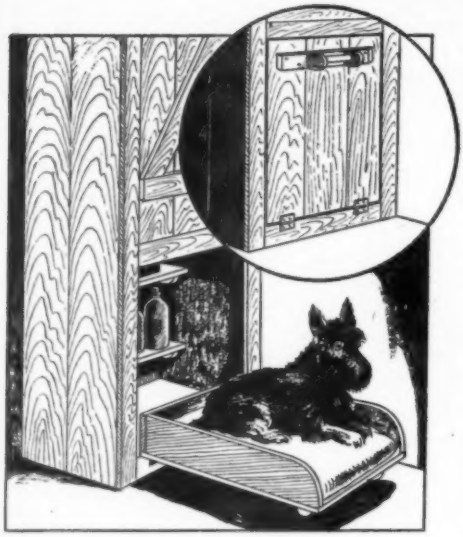




Measuring Molasses Easily

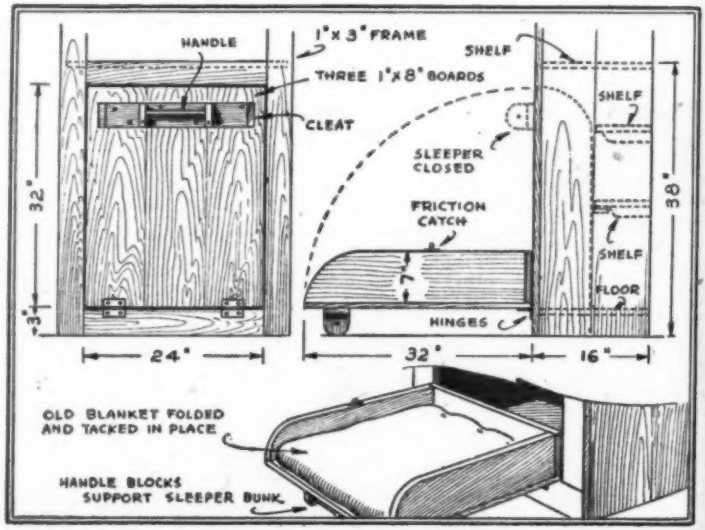
WHEN you measure molasses for a recipe, first dip cup full of flour, then empty it. This will prevent the molasses from sticking and every drop will come out of the cup cleanly.

"MURPHY BED" FOR MUTTS



by G. E. Van Horn

KEEP your dog's blanket in this snug "Murphy bed" in a corner of the basement. It swings down in a level position when your dog is ready to turn in, and swings up out of the way when closed. The bed can be made in a built-in closet, or newly built to fit a corner of the room, with shelves fitted between the sides for storing odds - and - ends or fruit and canned goods. The bunk itself is about 8" deep, 32" long and 24" wide, suitable for a small house dog. Eight-inch shelves are fastened between the sides of the compartment, back of the folded bed. Knotty pine, with black hardware makes an attractive cabinet and bunk, and solves that "littered" look of your basement if you keep a dog. Boards 3" wide are suggested for the frame, with cross pieces nailed at the bottom and top to form an opening 32" by 24". Three 8" boards are used for the bottom of the bunk, and are fastened together with a cleat, beveled at the ends, and secured by screws about 2½" from the outer end of the lowered bunk. Saw out two blocks, rounded at one end, for the handle blocks, and fasten them with screws to the bunk floor. A length of broom-stick 8" long is attached between the blocks, for the handle. Round the outside corners of the bunk as shown, and attach it to the cabinet frame with two strong hinges. The closed bunk can be secured with a catch (friction type) secured to the edge of the bunk and corresponding edge of the inside shelf. Nail boards between the sides of the cabinet to form a floor 3" above the cellar floor. Fold an old comfort or blanket and tack one end to the bunk floor. An additional blanket can be added on cold nights. For a sturdy construction, the frame of the cabinet and bunk should be made of two-by-fours, four vertical boards being nailed to ceiling joists and to a rectangular frame on the cellar floor. The sides and frame are then nailed over the two-by-fours. Shelves can be placed at desired intervals in the space above the dog bed, and the space enclosed with a door. Give the finished cabinet an oak or walnut stain, wiping off surplus, or paint to suit.



The Commandos—20th Century Knights

[*Continued from page 43*]

As I entered their camp, I hardly realized I was with a detachment of uniformed soldiers. They wore khaki trousers, but above that most of them wore only a turtleneck jersey and a wool cap. Some were in their shirt sleeves; and, although it was bitterly cold in their northern camp at the time, a good many of them were stripped to the waist. There is a science to keeping warm, and these men, through their severe training, know this science. Their total bedding equipment, I learned, consists of one light blanket and a ground sheet. They never wear an overcoat—are not even issued one.

They told me about their base training. It is so strenuous and their standards are so high that less than five per cent of their volunteers are finally accepted! Each Commando must be a top flight athlete. Included in their physical training are boxing, jiujitsu, wrestling, running, jumping, climbing, and a special "bull-in-the-China-shop" type of fighting.

I attended a few of their lectures: on how to wreck a railroad train; how to capture a tank; on personal camouflage, distance estimation, map reading and memorizing; code reading and signalling; on woodcraft and tracking (of a nature so severe that it would put an Indian to shame), and on many other related subjects.

But more than anything else I was interested in and amazed at their weapons. An officer explained to me that the Commandos must, most frequently, strike by night in the heart of enemy territory, where the least noise will expose them to possible capture or death. The Commandos, therefore, specialize in "silent death"—weapons that will kill suddenly and quietly.

All Commandos carry special garrotting wires. A garrotte is a flexible but strong wire which, when flipped around an enemy's neck and given a quick twist, results in instant strangulation.

"If you twist a bit too hard, it will cut off a man's head," one Commando said with a grin.

But there are refinements on this garrotte. The Commandos are taught, also, that if they wish to garrotte an enemy in such a manner that there is least chance of an outcry, the bandana handkerchief and the coin are the thing to use. If a coin is tied in a bandana and the bandana is slipped around a man's throat and twisted so that the coin is pressed against the enemy's larynx, the larynx is crushed instantaneously—and there is no outcry!

The Commandos have specially-made billy clubs, with a heavy lead tip—more deadly than any blackjack. A quick blow from one of these clubs will kill more swiftly than a machinegun.

Another favorite weapon of the Commandos is a wicked, double-edged, razor-sharp dagger—again, of the type foot troops carried for close fighting in the time of William the Conqueror, back in the year 1066! (Odd that weapons used by those successful invaders of the British Isles are repelling a would-be invader nine centuries later!)

But the most unusual of all their weapons is the mailed fist. It looks for all the world like one of those mailed fists worn by an ancient knight. Its purpose? It does a better job and is more persuasive than brass knuckles!

They're nice, gentle playmates, these Commandos! Especially nice to have on your side!

On the third night of my visit I was invited to accompany a unit of thirty Commandos to a certain port in southeast England, several hundred miles from the base camp. I was not, of course, allowed to go with them for their hit-and-run "target for tonight," although I would have given my right arm to have done so. In fact I did not know what the "scheme" was until after they had returned fourteen hours later with a story about one of the greatest and most successful "black phantom" guerrilla raids which had yet been made up to that time.

The large mother ship, probably a "dated" cruiser, on which were carried a number of specially-built Commando invasion boats, had taken the Commandos to within a few miles of the French coast. An invasion boat was quickly launched. At twenty knots that shallow-bottomed, thirty-foot, bullet-proof craft silently made its way to shore. As the keel grated on the beach, the ramp in the bow was let down and in double file the men, now dressed in shroud-like coverings, with blackened hands and faces, stepped ashore. They were in Nazi-occupied France about one mile from a large fishing village. A crew of two were left to watch the landing boat and to man an anti-aircraft gun. Two others patrolled the beach with Bren guns. These are fired by these "tough guys" from the hip.

Also put ashore when they landed were several smoke bombs. These were to be set off upon departure to cover their trail. The balance of the men proceeded in single file along the beach. The plan of attack had been worked out in advance by the aid of photography and maps. Several test raids had been made by one or two men who were brought close to the shore by submarine. They had gone the rest of the way by a collapsible boat launched from the submarine. They had "proven up" the terrain and checked the sentries.

Each man in the raiding party had a clear picture of the streets, alleys, buildings, and general layout of the town; knowledge of the German officers' dance to be held on that night; and a thorough understanding of the movements to be made. These men take no chances of a slip-up or unknown hazard. Their entire bag of tricks and equipment had been brought along that night. Each man had been issued several days' supply

[*Continued on next page*]

The Commandos—

[*Continued from preceding page*]

of iron rations in case he was prevented from getting back to his boat. He would then head inland, leaving a path of destruction and desolation behind him until caught. Anti-tank bombs and H.E. (high explosives) were carried by the officers. One bridge-head had been blown up during their retreat.

At the belt of each was his twenty-foot coil of thin, strong rope used for trussing up prisoners, climbing, and other equally vital uses. Several of the men had been assigned to a duty of pure sabotage—bombing and grenading and setting fire to anything that would burn, to create a screen of carnage, confusion, and panic while their comrades proceeded to carry out their job of kidnapping. Each wore his gas mask, steel helmet, and water flask. Their many-bladed service knife, Colt automatic, and barb-wire cutters made up the balance of their equipment as they descended silently and deathly, Captain Marvel-like, on the Nazi-held village that was the object of their raid.

The world was flashed news of that bold foray's success short hours after I met the Commandos when they returned, tired, smoke-soiled, some of them bloody from wounds, but all excited and exhilarated as much as their British reserve would permit them, at their new success. I saw the prizes they brought back to England's shores at the point of snub-nosed tommy guns: 67 German officers still very much astonished, chagrined, and angry. They had been caught completely off guard while dancing in the French coastal village, and were still stunned by the shock of being yanked from their terpsichorean bliss to the grim reality of capture as prisoners of war.

Later, I learned the details I've told you of that swift thrust, a raid that is but one small episode in the epic tale the Commandos are writing in Hitler's Europe. With their medieval weapons, their modern skill, and the everlasting courage that always is found on the side of right, they will go down in history as a legend of adventure, bravery, and vengeance—as the twentieth century's knights!

Camera Aqua-Batics

[*Continued from page 96*]

Place the camera close to the tank so that it can be tilted down slightly (about 15 degrees) and light with one flood in front of the aquarium at a 15-degree angle and a second on top of the aquarium, as in the photograph.

The background is immaterial when making a portrait like the one illustrated. For very light-gold-fish, a black background will prove more effective. For sunlit effects, a black background coupled with another flood next to the camera will be ideal. The fish will seem to gleam in the water.

The above conditions permit exposures from 1/10th second to 1/50th.

Full Steam For America

[*Continued from page 65*]

giant engines, turbines, whirl huge generators, and heat whole buildings. It could do these amazing things without the slightest danger of explosions that might well be feared in other types. Even the smug Vorkauf paid a compliment to the American inventor in one of his descriptions to the Nazis. "Not even the slightest danger has occurred with La Mont boilers. . . ." he told them. No wonder they were anxious to grab them for their navy. Hitler's biggest military secret was just an American invention. The vaunted pocket battleship might well be termed the pick-pocket battleship!

These boilers which the Germans so eagerly lifted from us have run as long as 60,000 hours without even the pump changed. Think what that kind of stamina means to the raider. But La Mont boilers aren't limited to sea and land operation. They can furnish power most anywhere that power is required. In fact, boilers of this type have already been planned both here and abroad —for airplanes.

New Products And Inventions

[*Continued from page 32*]

A newly patented kitchen chair provides built-in tables which can be folded out of the way under the seat of the chair. The tables can be swung out on either side of the chair to supply rests on which usual kitchen tasks can be performed. The tables can be so arranged that on one side a pan or pot can hold things to be worked on; while the other rest may support another pan or pot for the things that have already been worked on. Both rests are at a comfortable level. Suitable springs are used to maintain the tables in desired positions.

* * *

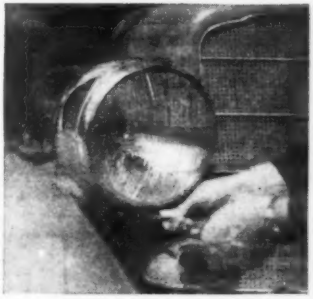
Automobiles are easily protected from weather conditions, such as rain, snow, dew and from sun rays by means of a new slip cover. The box-like

[*Continued on page 152*]

What's Your Car Trouble?

If you have a problem with your car, ask Mr. Russell. Just send stamped, self-addressed envelope for a personal reply.

by Frederick C. Russell



Will it harm the headlight reflectors to clean them now and again? S. A.

Do this only when necessary. Use a very soft cloth or absorbent cotton, and rub without pressure in a circular motion. It will help keep reflectors clean to tighten the lens holder.

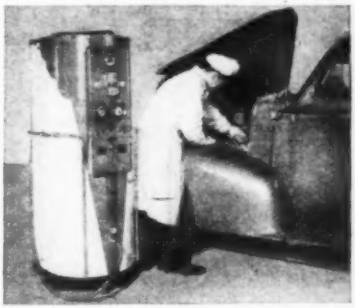
I have nearly given up trying to find out why the engine of my car overheats so consistently. A service man and I have tried everything we can think of, including re-timing valves, replacing oil pump and discarding the old thermostat. Trouble has developed since winter. G. R.

Wonder if you have considered possibility of back pressure through a dented tail pipe? One motorist who wrote me recently found that he had backed into a block of ice.

What is the best time to add water to a battery? F. F. L.

After the engine has been running and before you plan to use the car for at least a half hour. Use a syringe to avoid spilling water and acid over nearby parts.

How can I tell if a valve spring is weak? G. L. K.



Remove the valve cover plate, idle the engine and hold the end of a screwdriver between coils of each spring being tested. If the engine runs better when any one spring is given more tension the spring should be replaced.

I am considering having the engine oiling system pressure flushed. Are there any precautions to note? H. B. E.

The operator will know all the angles but you might remind him to remove the oil filter cartridge. If this isn't done the dirt will be carried through the engine.

The generator brushes on my car seem to rise and fall. One of them recently jumped off and stuck in its holder until released. J. R.

The commutator needs to be trued on a lathe.

How can I stop water from leaking to the rear flooring of the car in a heavy rain? D. S. M.

The drain holes at the bottom of the doors need cleaning out. Also check the drains of the rear quarter windows.

What is the proper way to adjust an engine's idling mixture? S. N. A.

Screw the adjustment in clockwise until the engine threatens to stall, then screw it out until the engine starts to roll. Set with the screw turned in just enough to check the rolling.

No Blackout For America!

[*Continued from page 56*]

This type of decoy lighting, however, is not too practical, particularly from the cost angle and because of the tremendous amount of work entailed to do it on a scale large enough to make it effective. Well-placed flares would produce a blaze of light and defeat the plan's purpose. Fake airports might get our own planes into trouble, might bring them down into a swamp when making an emergency landing. Further, it would be hard to justify use of electric power to light the decoy lamps, when there is such a pressing power need for actual production purposes.

The primary objective of the dimout would be to reduce an entire area, perhaps as large as several hundred square miles, to an overall indistinct sameness, creating a characterless topography in which there might be light but no guiding lights.

Because any navigator of the air, worthy of the name, would know by instrument and dead reckoning when he reached the vicinity of New York or other coastal cities, it would not be necessary to black them out.

But metropolitan New York is the most brightly lighted area in the world. Manhattan is surrounded by water, a fact which makes the island an almost perfect target. On Long Island, just across the East River, are Brooklyn and Queens, and to the north is the Bronx. Across the Hudson is New Jersey, made distinctive by innumerable industrial plants and by cities like Newark, Jersey City and Hoboken.

At night this whole area has a recognizable map pattern made by lights. There are many prominent landmarks which would help direct an enemy pilot to his objective. By eliminating these and dimming or darkening where necessary, metropolitan New York might be reduced to a vast meaningless checkerboard in which no specific targets could be located.

Broadway, slicing across Manhattan island like a blazing knife, would probably be darkened completely. Times Square, ordinarily bursting with millions of unloosed watts of light, would be reduced to the equivalent of an innocuous street intersection in Queens. Lexington, Fifth and Seventh Avenues, and other bright stripes of light-revealing uptown streets, would look like residential areas. The East and West Side superhighways would be blacked out. Radio City, the Empire State building, the Chrysler building and other prominent signposts would be black and lifeless. The necklaces of light which betray the George Washington Bridge across the Hudson and the East River Bridges would disappear.

The prominent streets in Newark would lose their night brilliance. The major highways streaking across the Jersey meadows and the Newark airport would not be identifiable. Fordham Road in the Bronx would look like any other street in the Bronx. Out on Long Island, near the site of the World's Fair, LaGuardia Airport would resemble pasture land. Coney Island, off in another direction, would be as outstanding as a grave yard.

In other words all those distinctive map pattern lines or clusters of illumination, which could serve as points from which a bombardier could estimate the location of a specific target, such as a ship yard, a railway center, an important manufacturing plant or area, would be blotted out or toned down.

All this might be achieved by careful study and control of New York's millions of lights. Where lights are not turned out completely, they might be carefully shielded from above. Traffic lights under no circumstances should be turned out. Because of the possibility of reflection on wet pavements, they might be hooded with pipe-like extensions.

Normal street lighting in residential areas might be partially left on, or perhaps covered so as to throw light downward only. Homes would not be required to black out entirely. Only normal precautions would be urged, such as pulling of

FOR DEFENSE

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shades, turning off porch lights. A few stray beams of light which might escape here and there would have no meaning to a flyer miles over head.

In a dimout, as in an all-out blackout, only the most essential traffic would be permitted to move. Cars and trucks would have white stripes around them, or fenders painted white for better visibility. Their headlights would be dimmed to almost moonlight intensity. Vehicles might carry small lights under the chassies pointing downward, which would reveal them in silhouette. But in the main, drivers would be required to move at a snail's pace or pull over to the curb, turn out all lights, so as not to help indicate main traffic routes.

Lights in shop windows would be turned out. Electric signs would be eliminated. All unusual types of illumination such as mercury vapor or neon, which might be indicative of industrial plants would be shielded or switched off. Sodium vapor lamps supplying a typical golden light along highways, at intersections and tunnel and bridge approaches, would not be permitted to burn.

"John! You're not in the butcher shop now."

Floodlighting the facades of buildings as a protection against sabotage need not be abandoned. Viewed from the air, these light patterns can be made almost invisible by careful concealment.

Pedestrians under no circumstances, except the most urgent, should be abroad during a raid. They should not travel in darkened areas without some form of identification to prevent accidents. A hooded flashlight might be permitted in some cases. Small reflector buttons could be attached to the clothing, or something white worn on the hat or about the waist or arm.

All vehicles might be painted with some sort of dull finish to rid them of their sheen. Modern all-metal tops reflect light exactly like water. A large number of cars parked, perhaps, by a defense plant could be seen from the air because of reflections and might reveal to a smart pilot the location of an important factory otherwise invisible. A long line of automobiles stopped along a highway might be spotted from the moonlight on their tops.

The use of special paints which glow in the dark with low brightnesses may become important in defense preparations for either dimouts or blackouts. There are two types—fluorescent and phosphorescent. The first is luminous only when excited by ultraviolet or black light. The second may be activated by daylight or incandescent illumination and will glow in the dark for at least thirty minutes after lighting is cut off.

While the light thrown off by these paints is readily visible on the ground, the intensity is so low that it cannot be detected from the air.

These paints might be used for a great number of purposes, limited almost only by the imagination. They might be coated on fire extinguishers, first-aid cabinets, stairways, switch handles and door knobs, shelter signs, articles of clothing, curbs, traffic officers' uniforms and so on.

It is conceivable that automobiles might be equipped with special black light lamps giving off invisible ultraviolet to make traffic and road markings visible. Pedestrians might carry black light flashlights.

The usefulness, however, of these materials is at present limited by several factors. First, the weathering qualities of both fluorescent and phosphorescent paints are not sufficiently high to permit their extensive application outdoors. Second, in connection with fluorescent paints, the supply of black light lamps is limited due to the war. Moreover, the cost of both paints and lamps is greater than for ordinary paints and light sources.

It is not likely that the dimout will displace a blackout in case of an actual raid, even though theoretically a dimout might be just as effective a defense measure. The biggest reason for this is psychological. Everyone, regardless of his situation or background, believes in the fundamental safety of darkness. "If you can't be seen, you are safe," is the general opinion, despite all evidence to the contrary.

Also, it is still possible that the problems involved in applying a dimout may be just as great as in applying a blackout. It is much easier, for most people perhaps, to turn out all lights than just a few of them. The dimout, however, is important and its basic principles are sound.

New Products And Inventions

[*Continued from page* 148]

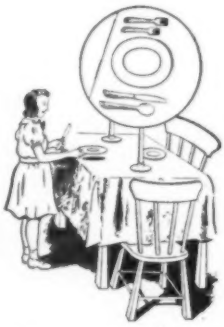
slip-over cover includes a top section, side sections, a front unit and a rear panel. The shape of the cover is such as to provide a firm attachment to the automobile. Slide fasteners are used to close slots in the front, rear and side panels. These slots when open permit the easy and quick application and removal of the cover from the automobile. The rear panel also has a slot which permits the license plate to be visible when the car is parked. Slots are also provided in front of the headlights and tail-light. The cover is made of a suitable waterproof fabric. If the automobile is to be driven for only a very short distance, a removable panel in front of the windshield can be removed without affecting the rest of the cover.

* * *

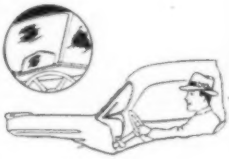
A pedal exerciser for home use imparts a seesawing motion to imitate the effect of a bicycle rider going up grade. The device includes two end sections and a balance board mounted on a shaft between the sections. The balance board is of sufficient length to extend beyond the end sections, and rubber pads at each end of the balance board prevent foot slippage. The teeter-totter motion exercises the body by natural body resistance, that is, one leg or one side of the body resists the other leg or other side of the body.

* * *

Training children to properly set silverware on a table should be a simple matter with a newly patented set of table flatware. All the pieces of the new flatware have a common design on the handle. However, the design is reversed for the pieces on opposite sides of the plate so that curving lines which form a part of the design face each other. The ornamental lines on the forks at the left of the plate curve from the left toward the plate; while the lines on the knife and spoon curve toward the plate from the right. A symmetrical balance is obtained when the pieces are properly placed on the table.



To overcome the glare of reflected sun rays from the polished surface of an automobile engine hood, a novel light shield has been designed. The shield, made of a suitable translucent or opaque material, is placed on the inner side of the windshield, and is of a size and shape to effectively block all reflected light from the eyes of the driver. The cowl portion of the automobile is provided with a slot or guideway in which the shield can be mounted.



* * *

A novel safety appliance for workmen engaged in repairs, painting and similar work on slanting roofs is shown in a recently issued patent. The invention consists of a strong bag made of canvas or like strong woven fabric and filled with a weighty material such as sand. Wide bands are stitched around the bag in both the length and width, and to the lengthwise band a flexible wire or rope is fastened. The other end of the rope is made into a large coil which goes around the body of the workman. In operation one of the heavily filled bags is placed on the slope opposite where the work is to be done, and the rope is passed over the ridge to the worker. Due to the weight of the bag and its frictional resistance on the roof to an upward pull, the bag serves as a safe anchorage. The bag can be easily shifted along the roof to any desired point.

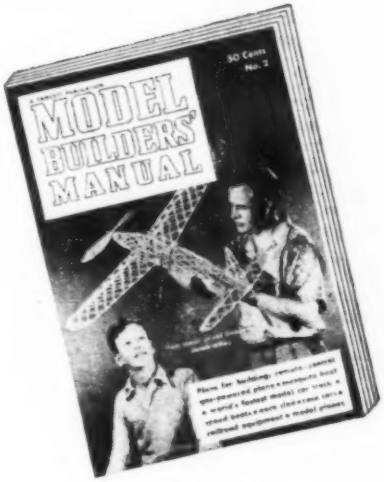
* * *

Patents Identified

Autocover	No. 2,253,766
Exerciser	No. 2,253,993
Tableware	No. 2,244,590
Chair	No. 2,244,459
Shield	No. 2,253,763

[*Continued on page* 176]

Handyman's Delight!



HERE are two superb new books that will delight the heart of every handyman and every man or boy who likes to work with tools! At only 50 cents apiece, they provide a wealth of entertaining and practical projects for the home workshop. Every project is complete with clear plans, detailed instructions and all the information you need to turn out a piece of work you can be proud of. Order your copies of the new MODEL BUILDERS' MANUAL and HOW TO BUILD IT today! Use coupon below.

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Back To The Bike

[*Continued from page* 105]

of the axle you'll find a square-headed machine screw sticking out. Its purpose is to press against the axle, thus keeping proper tension on the drive chain. Loosen these screws (after loosening axle nuts) until the chain can be slipped off the sprocket. *Do not remove these screws from the frame.* Remove axle nuts, followed by stand (if rear type) and fender braces. Take off the bracket holding coaster brake arm to frame. Slip wheel from fork. Rear fender can now be unscrewed from the frame and taken out. Lay wheels aside for the time being.

It should not be necessary to disassemble pedals, crank and large sprocket, and if these are in good working order, leave them alone. If for any reason you want them off use the cone wrench on the pedals and a large Stillson or monkey wrench on the crank nut *opposite sprocket.* They are all *left threaded,* so must be loosened in opposite direction from conventional nut. The chain has to stay on, as it weaves through frame.

Right the frame and take off saddle and handlebars. The latter are easy if you know the trick. Just back out the shaft nut six or eight turns, then give it a smart rap with the wrench. Bars will then lift out easily. Drawing (p. 105) shows how this works.

Before starting the pre-paint job, check the front fork for trueness. If it is warped or twisted it can be straightened cold with a vise or C clamp and pipe wrench, as shown in one of the photographs. Take pains to get the fork accurately lined up, because the front wheel will always pull to one side if the fork is out of kilter.

Now you are ready to refinish. Hammer out all fender dents, using a ball peen hammer with a hard wood back-up block. If the old finish is very bad, paint remover may be necessary, but the chances are a good smoothing off with emery cloth and steel wool will be sufficient preparation for the undercoat. If you have a power-driven grinder-buffer, this job will be a cinch. Be sure to work on all rust spots until they show clean metal. Steel wool the insides of the fenders until they are spotless. Apply the undercoat and set fenders aside to dry. Although every inch of surface on a bike is curved, you can get a perfect, spray-looking paint job with care. Use the paint just as it comes from the can, without thinning, and brush out well. A fairly fast-setting paint is preferable, as it is less inclined to "run." Lacquer is not recommended unless you have a spray outfit.

Follow the same procedure for the frame, trussing it up in a convenient working position. Any dents in the frame tubing will naturally have to be left as they are, removal being impossible.

While fenders and frame are drying you can turn your attention to the wheels. Don't take axles and bearings out if they seem all right, but it's a good idea to back the cones out and push some grease into the bearings. Take care when doing this, particularly on the front wheels, or some of the balls may fall out and you'll have the devil's own time getting them back in again.

"This one costs more—it goes knock-knock instead of bang-bang!"

If there's an oil cup on the hub lift the cap and squirt in a little *very light* oil or kerosene.

Clean hubs, spoke roots and exposed brake parts with gasoline or alcohol and a rag. Do not use too much solvent on the rag or it may seep into the bearings, thinning the grease. Use steel wool on the spokes and rims. If the latter are painted, or are chromium and badly rusted, rub them down well as you did fenders and frame, and apply undercoat. If they are chromium and in fairly good condition, simply steel wool lightly and clean with Noxon or other metal polish. The handlebars can be given the same treatment as the rims. If they are to be painted, a nice effect can be obtained with the crackle lacquer made for radio cabinets and sold by radio stores. If you use this put it directly on the bare metal and apply thickly, as only one coat is possible.

When undercoat on frame, fenders and other parts has dried, rub lightly with steel wool and brush on enamel finish coat. If two finish coats are necessary, rub down again after the first one.

Before putting the saddle back in place paint the springs and rest of under parts with black enamel. Give the saddle itself a good scrubbing with saddle soap. This both cleans and preserves the leather. The crank, pedal axles, sprocket and

stand should be aluminum painted if badly worn.

Commence reassembly with saddle and handlebars. Put the bike on its back again for fender and wheel installations. Do the front wheel first, and set up the cones against the bearings just a bit on the loose side so that when the axle nuts are tightened up the wheel will spin perfectly freely, yet without any wobble. It may take you two or three tries before the wheel is just right, so don't give up if the first attempt fails. See that the wheel is centered in the fork—this is done by tightening the axle nuts alternately until it's just right.

The rear wheel takes a little longer but isn't any more difficult. Push it all the way down in its slot and slip the chain back on the sprocket. Now re-tighten the square-headed set screws until the chain has enough tension to keep it in place. Turn both screws exactly the same amount. Don't make the chain too tight—it should have just a bit of slack. Place the fender struts and stand arms over axle and partially tighten nuts. Attach the coaster brake arm to frame with its bracket. Next, set the nuts up fairly tight and test the coaster brake. Crank the pedals until the wheel spins fast, then back them to apply the brake. The wheel should stop quickly and smoothly, without a great deal of pressure being applied to the pedals. If the brake slips, squirt a little kerosene into the hub oil cup and spin again. When you've got the brake working to your satisfaction set the bearing adjustment cone as you did on the front wheel and give the axle nuts a final tightening.

While on the subject of brakes, several excellent front wheel brakes are now on the market at reasonable prices. They can easily be installed by the bike owner, and provide an extra measure of safety, particularly in hilly terrain. Another valuable bit of equipment for riders who live in up-and-down country is the New Departure 2-speed drive. It fits any New Departure coaster brake and makes uphill pedalling a cinch. If you intend equipping your bike with one of these, do it before putting the wheel back in place, following installation directions that come with the attachment. Sketch on page 104 shows how the controls can be located.

Put on the chain guard, basket, etc., and you'll be ready for a trial spin. Dirty tire walls can be cleaned very nicely with soap and water. Don't forget to check tire inflation before going for the first ride. Thirty-five to forty pounds of air is about right for the average single tube tire.

Improving Your Grinder

[*Continued from page* 112]

with both coarse and fine wheels, one grit is sufficient for the average home shop. The utility of the machine can be doubled by replacing one wheel with a cloth buffing wheel. Used with a suitable buffing compound, this will provide the means of obtaining a beautiful polish on metal or plastic objects. Be sure to remove the tool rest and wheel guard before using the buffing wheel because polishing requires free access to all parts of the buffing surface.

Lifting handles are provided on some grinders, but if yours has none, one can be made from a window sash lift. Fasten it to the grinder motor end castings with four machine screws. Holes for these screws should be drilled and tapped after the ends are removed from the motor, to avoid damaging the windings. Small metal blocks under each end of the handle will raise it enough to allow a full grip when carrying.

Perhaps these general hints will suggest other specific improvements that can be added to your particular grinder, such as dust catchers, water containers, and other changes which will greatly improve its usefulness.

Two-Man Railroad

[*Continued from page* 39]

has five and one-tenth miles of 60-pound steel track and a personable ten-wheeled engine affectionately known for miles around as "ol' 949"—puffed along on its carefree, dependable way. During its 32-year life, the railroad has never borrowed nor gone through bankruptcy. It has no bonded indebtedness. It has only two employes and few assets, true—but last year it operated at a profit of $600.

The Great Northern railroad discontinued its service on the Douglas-Waterville spur years ago because of a three per cent grade along the 5.1 mile length. Though they knew no more of railroading than most customers of a line, farmers of the area banded together to assume ownership and operation of the road, appreciating the value it had been and could continue to be to them. By limiting 949's burden to four loaded cars as a maximum, the three per cent grade which discouraged the Great Northern, has been negotiated without trouble during the years since the farmer-railroaders assumed control. Twice a week the train makes the trip from Waterville to Douglas.

The railway's entire personnel is composed of John Sekavec, who's been engineer for six years, and Walter Holmes, who combines the duties of fireman, conductor, brakeman, switchman—and section gang when necessary!

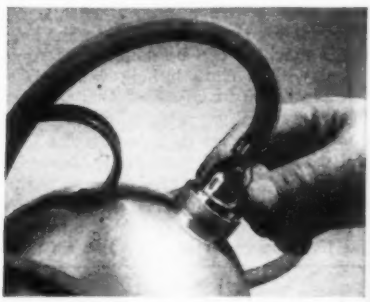
STEAM BRUSH
removes wrinkles

A PORTABLE steamer that needs only to be brushed over draperies and other household furnishings in order to renew the material and remove wrinkles, can be easily made from a common teakettle and a portable shower brush. The device was invented by Harry Blackstone, the famous magician, who uses it to freshen and renew feather bouquets which are among the properties exhibited in his show.

The portable shower may be of the type fitted with a brush having an internal nozzle of many perforations, or with a perforated metal shower head. Both are equipped with a length of rubber tubing and a faucet connection. The latter will fit most teakettles. To make the outfit entirely portable, the teakettle should be used with an electric hot plate.

Partly fill the teakettle with water and heat it until steam is generated, then merely brush the shower attachment over the material to be treated. The steam escapes in fine jets so that the action is smooth and even.

Above: Steaming a window drape with the brush. It is portable and operates on any house current. Left: Harry Blackstone, famous magician, invented the device for restoring feather flowers. Below: Rubber connecting plug of the shower hose will fit the spout of most tea and hot water kettles.



Dressing Up Tin Can Flower Pots

USING discarded ice cream cartons and corrugated cardboard strips (left), you can make attractive jackets which will do wonders for those unsightly tin can flower pots that detract from your pride in your plant display. Cut strips to necessary width, with a little margin to extend above the ice cream cartons, and long enough to go around the carton. Gluing the strips to the carton makes a stronger, more durable jacket than the strips alone.

Magnetic Midget Flash

[*Continued from page* 99]

the bottom serves to hold the coil in an upright position. A hole drilled directly into the lower end of the core and tapped will hold this screw in place.

The casing for the tripping mechanism is made of the material used for the battery case. The sides, back, and front are all made from a single piece. A slot must be cut out of back and front to allow armature to ride easily in its place.

Both the top and bottom of this casing have holes drilled in them. The top cover hole should be threaded to take a small machine screw which is used to adjust the action of the armature. The top covering should also have a small piece cut out of it to allow a space for the armature to move freely.

A bracket, bent and drilled as shown in Figure 5 is attached to the coil casing. This allows an up and down adjustment. The long bolt on the side provides a means of stopping the arm in the proper position over the shutter lever.

The bracket for mounting the tripper near the shutter (Figure 1) is merely a single piece of aluminum or brass strip folded over. If this type of a lens board is not on the camera, an ear can be left on the upper end of the bracket and this attached directly to the lens track.

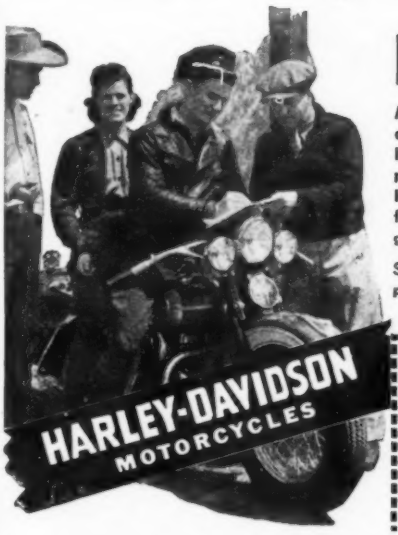
When the whole apparatus is complete and ready to use it must be adjusted for synchronization. The trigger on the lens should be in such relation to the armature of the coil that it requires almost an imperceptible action to trip it. This point may be determined by placing the armature so that the shutter is already tripped. Then the screw on the upper cover of the coil covering should be loosened up. The armature should just touch the end of the trigger.

Hectograph Surface

[*Continued from page* 113]

as the composition has set. To store the sheets until required, and keep them free of dust, place them one upon another to form a pad. One may be separated and peeled off when required. Lay a sheet on the treated surface of the base and press it into contact, where it will be held by the compound. The copy is prepared in the usual manner with hectograph ink or ribbon and pressed face down onto the gelatine-coated sheet on the base. After a sufficient number of copies have been made, strip the hectograph sheet from the base and place it on the bottom of the pad of fresh sheets. Strip a fresh one from the top and attach it to the base for each new copying job. —*Ken Murray.*

ALL OUT FOR *Victory* WITH



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Fly Your Models On A Wire!

[*Continued from page* 68]

mathematically worked out on an electric-eye speed finder used in tests. This in turn means a circumference distance of 1/16-mile, plane travel. Under racing conditions, or in endurance tests, a plane thus turns 16 laps at flying speed to go one mile. In the Long Beach meet, which featured models of the army fighter type, these little craft, powered with tiny motors you could nest in your hand, turned upward of sixty miles per hour. Don Hodgson, who established the mile record for the meet, sent his little ship around the course at an average of 69.72 miles per hour.

Since then many new ships have been built, several capable of turning eighty miles per hour. When the boys start concentrating on racing planes, Don believes that speed will in no time zoom to more than 100 miles per hour.

When the U-Control artists go after endurance marks, however, larger planes are used, specifically to hold more fuel than the four ounce load carried in standard Fireballs.

Present endurance record stands at slightly over two hours and was made in a special model with a four-foot wing-spread, built by Dean Degonia of Los Angeles. The plane was powered with a Bunch "Tiger" model motor of ⅕-h.p. and averaged 50 m.p.h. during the flight.

Although comparatively inexpensive to build up, the models are a far cry, indeed, from being simply toys. The Fireball, for instance, one of the simplest models, is a fighter ship with a 36-inch wing span, weighing only 28 ounces. It is powered with a single-cylinder model airplane motor, which generates from ⅕ to ⅓ horse power. Speed of the average, properly assembled model, is about sixty miles.

The super-midget motors used are in themselves miracle models of engineering ingenuity. Standard motors are single-cylinder, two-cycle power plants weighing, at an average, 8½ ounces. Average fuel used is composed of two parts of high octane gasoline to one part lubricating oil (usually castor oil or SAE 70). Experimentalists often vary this though, using an alcohol mixture with castor oil and a small portion of ether. From here they may go to strange and radical ideas. Some have tried acetate and menthanol mixtures; others, paint thinner and benzine. Johnny Kuykendahl, one of the most successful U-Control pilots, has successfully used the super-hot Dynax mixture, a favorite fuel of outboard motorboat racers.

Absolute precision in building up both planes and motors is the vital quotient which lifts the sport beyond the hobby stage. Motors must be right to the last tiny piece of mechanism and perfectly adjusted in order to stand speeds which average from 7,500 r.p.m. to as high as 12,000 r.p.m. with a full load. In tests conducted at California Institute of Technology at Pasadena,

[*Continued on page* 159]

Hand-Clap Radio Control

[*Continued from page* 116]

List Of Materials

1 piece wood, ½"x3½"x6½" (mounting board, figure 1)
1 piece wood, ½"x3"x5" (relay base, figure 18)
1 piece wood, ½"x5"x5" (sound box base, figure 25)
1 piece wood, ½"x¼"x1" (pendulum support, figure 22)
1 piece brass, ½" square, ¾" long (armature strip support, figure 2)
2 pieces brass, ⅜" square, ¾" long (spring contact support, figure 14)
1 piece spring brass or phosphor bronze, 26 gauge, ⅜"x6" (armature strip, figure 3)
1 piece sheet copper, 22 gauge, ⅜"x¾" (insulated contact, figure 4)
2 pieces sheet copper, 22 gauge, 1¼"x1¼" (controlled circuit contacts, figure 7)
2 pieces mild steel, round, ⅛" in diameter, ¼" long (armature pieces, figure 5)
2 pieces mild steel, round, ½" in diameter, ½" long (armature counter-weight, figure 6)
2 pieces mild steel, round, ⅜" in diameter, 1" long (magnet core, figure 10)
2 fibre disks, ⅛" thick, 1⅛" in diameter (magnet coil ends, figure 11)
2 pieces sheet iron, 20 gauge, ½"x1¼" (magnet mounting brackets, figure 12)
1 piece spring brass or phosphor bronze, ⅛"x2" (switch arm, figure 16)
1 piece wood dowel, ⅜" in diameter, ½" long (switch knob, figure 17)
¼ lb. enameled magnet wire, 30 gauge (for coil windings)
6 inches spring brass wire, 26 gauge (coiled springs, figure 15)
1 coffee can, 1 lb. size (figure 19)
1 piece sheet copper 22 gauge, ½"x2¾" (pendulum, figure 21)
1 piece sheet copper, 22 gauge, round, ¾" in diameter (center contact, figure 23)
3 pieces sheet metal, 22 gauge, ½"x1" (flashlight cell retainers, figure 24)
3 flashlight cells
2' magnet wire, 22 gauge (for relay and sound box connections)
1' magnet wire, 18 gauge (for controlled circuit connections)
6 flat head machine screws, ¼"x6/32"
11 flat head machine screws, 1"x6/32"
3 round head machine screws, ¼"x6/32"
3 round head machine screws, 1"x6/32"
3 round head machine screws, brass, ¼"x6/32" (for switch contacts and arm)
1 machine screw, 2"x6/32" (for supporting armature counter weights)
2 flat head wood screws, 1", No. 6
3 round head wood screws, ⅜", No. 6
1 flat head wood screw, ¼", No. 3
3 brads, ½" long
20 hexagon machine screw nuts

"That sack of seeds you sold me last month leaked on my beard while I was carrying it home!"

Fly Your Models On A Wire!

[*Continued from page* 158]

California, the r.p.m. have gone as high as 30,000, with the prop removed and turning simply on a flywheel. Compare this to your big planes, which normally turn from 1,500 to 2,400 r.p.m. at top speed.

Plenty of skull practice goes into the building of controlled flying models; and for this reason, the sport has appealed to youngsters and adults in every walk of life. Louie Meyer, automobile speed king and veteran winner of the Indianapolis classic, is an ardent hobbyist. So is Foote Field, Long Beach, California, newspaper reporter. Two enthusiasts are Joe Marriott, chief of the Civilian Aeronautics Administration, and Earl Bowden, traffic control expert at the Lockheed Aviation Plant in Burbank, California. Tex Rankin, noted stunt flier, has adopted use of U-Control models to get reaction data on his student fliers.

Your Archery Equipment

[*Continued from page* 109]

cave side is referred to as the belly and the convex side is the back.

The wood can be removed with a plane at first, then with a spoke-shave, and finally, when a very little wood must be removed at a time, use a piece of glass as a scraper.

Put the bow back on the jig frequently. Tillering is not a difficult process, but patience is required.

Watch the bend of the bow against the white lines. If one limb bends more than the other, remove a little wood from the belly of the stiffer limb.

A good stopping point is when a twenty-five pound pull, as measured on the scale, draws both ends of the bow down to a white line that is about twelve inches below the level of the shelf.

This will result in a thirty-five or forty pound bow. That is, a pull of thirty-five to forty pounds will be required when the bow is used with a 28" arrow to pull the bowstring back far enough so that the point of the arrow is at the handle of the bow. This is the correct position of the arrow when aiming at target or game. A thirty-five to forty pound bow is a good one for all 'round use and it is suggested that no stronger bow be made if this is a first attempt.

A stronger bow can be made at some later time when the muscular strength that its use requires has been developed.

The second part of this article, describing the completion of the bow, bowstring and the making of arrows and target, will be contained in next month's issue. Be sure to watch for it.

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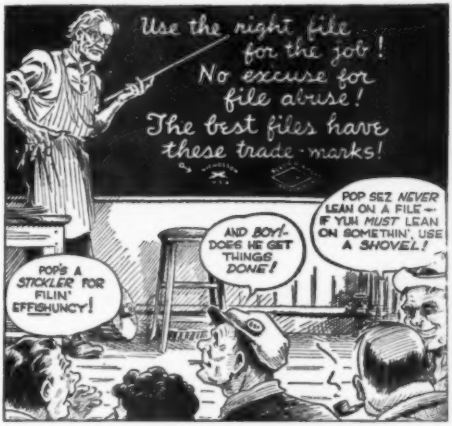
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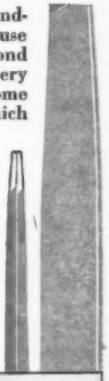

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Plane Flies With No Propeller

[*Continued from page 49*]

coupled to the blower, air from the nose intake is drawn over it at high velocity. The proportions of the ship indicate that the engine is mounted ahead of the blower.

Colonel Mario de Barnardi, Schneider Trophy pilot in pre-war years, is now putting the ship through its paces. The highest speed yet attained by it was 130 miles per hour, which though unimpressive, isn't bad performance for a radical design. The principle may open the way to flights faster than sound. On the longest cross country flight that the ship has attempted, 168 miles, it carried not only its pilot but also a passenger and a mailbag.

The major advantage of this type of jet propulsion over combustion type rocket propulsion is in the longer cruising range. Up to now conventional type rocket planes have shown more promise in the realm of speed than in range. America's rocket wizard, Goddard, has sent some of his wingless jobs whistling through the sky at 700 miles per hour. Fritz von Opel, German speed demon, drove his rocket car well over 100, attaining the speed within a few seconds from the start. Later, not wanting to risk his neck in a super speed test, he honored a cat by letting it ride along a railroad track in his flange-wheeled rocket car. The cat had the thrill of hitting 200 before the rocket car blew up. That finished the cat.

To get back to America, Inventor Elman B. Myers has another version of jet propulsion. Although it operates on the same general principle as a rocket, the propulsion impulses are intermittent. Known as the "jet-impulse motor," the apparatus has been given lengthy tests. After one very satisfactory demonstration during which it drove a station wagon around Langley Field in Virginia, the motor followed the example of its rocket brothers and sisters, and blew up.

The explosion hazard seems to be one of the most difficult drawbacks to overcome in rocket design, a fact that adds favor to the Campini type of propulsion. Experiments were made several years ago with a propeller enclosed in a modified Venturi tube. The same general idea as that of the Campini ship was the basis of the design. The narrow neck of the tube behind the tractor propeller was intended to add velocity to the air. Tests paved the way for current developments.

Little Mae Too, Sailboat

[*Continued from page 123*]

the exact bevel for the sides and bottom should not be cut until they are in place. We are now ready for the keelson. This is fitted inside the stem and stern to their respective knees. It is held to the frames by a clamp on its edge. The keel is then bent over this, with glue or paint between. The keel extends over the bow and stern, and is sawn off afterwards. With the keel and the keelson properly centered, fasten them both to the floor pieces with ¼" galvanized carriage bolts with the heads counter-sunk so the tops are flush. Screw the ends to the bow and stern and their respective knees, and saw off flush.

Fit cheek pieces on the side of the stem and stern, and notch the frames for the chine. The chine can be made from a 1¾"x⅝" piece ripped in half, put in place and glued together. This makes a strong job and helps to hold the boat in shape. If one piece is used, it should be only 1" deep. They are fastened to the frames with 1½" wood screws. After the chines are in place the entire frame work should be dressed down to the proper bevel, and all made smooth.

This is a good time to install the centerboard box. Cut the notch in the keel and fit the posts. Clamp the side boards to the posts, not too tightly, and fasten through the keel and keel batten with 2½" No. 10 wood screws. The side boards are then screwed to the posts or riveted through both sides. Before the box is put together, the inside should be painted with a couple of coats of anti-fouling paint. Use marine glue between the bottom board and the keel batten, and between the side boards and the posts. If the side boards are of more than one piece, dowels or splines should be used in the joint to keep the boards in line.

There is nothing unusual about the planking, except perhaps the thickness, which is only ⅜". In the original boat, the fastenings were countersunk and plugged with ⅜" wood plugs, but it would be better to drive the fastening home and fill up the indentation with a good filler. The fastenings along the keel and in the seam batten are copper tacks clinched over on the inside. The clinching should be done while the tack is being driven. This will turn the point over and back into the wood and little or none will show on the inside. The fastenings along the chine and at the ends should be screws, about 1" No. 8 flat head. The fastenings into the frames can be 4 d galvanized head nails. While it is poor practice to use different metals for fastenings, in a boat of this type, which is mostly out of the water, there is little or no danger of the fastenings being impaired by electrolysis. Each bottom plank should be fitted before its outboard batten is installed. These battens should be notched neatly in the frames and fastened in the center with one nail.

[*Continued on page 162*]

The Shivering Lens Camera

[*Continued from page 45*]

No less an authority than Thomas A. Edison called natural depth in photography "the next important step in cinematography." Evidence of numberless efforts and hundreds of thousands of dollars spent in trying to discover the way to make that step clutter the Patent Office's files. Most researchers and experimenters based their work on stereoscopy—yet if possible in movies a stereoscopic picture or couple can't be viewed for more than three minutes continuously without blurring vision.

Recognizing that, the late Dr. Ludwig Dieterich, Austrian-born engineer, 15 years ago devoted himself to this problem, and formulated a simple theory: a lens that would focus clearly at every perceptible distance and at the same time not change the size of the various images at different distances from the viewer. Although the theory was simple, its execution became one of the most complex and important optical discoveries of all, time.

Before that was accomplished, Dr. Dieterich went through the extended period of discouraging and apparently resultless labor which besets so many inventors of revolutionary instruments. His theory, solution, and the lens he sought were declared optically impossible by recognized scientists. He used up his friends' and his own funds, had to postpone his work several times until more money could be obtained. At one period, however, Dr. Dieterich with limited funds and apparatus took 3,300 photographic hand tests; only three were successful, but he thus demonstrated to himself that his theory was correct, and that with the necessary refinement and development his lens would indeed become a photographic eye.

Patents, applied for in most countries, were in several cases refused until actual film was furnished which showed the definite and unquestionable result. Then several cameras were equipped with the new lens, which Bausch and Lomb had succeeded in grinding to meet the inventor's purpose, and successively satisfactory performances were obtained with them.

Shortly before Dr. Dieterich died, P. Stanley Smith, a young sound engineer who had been working on the same idea independently, discovered that the former's patents precluded his progress. The men chose to collaborate. Mr. Smith applied for patents on electrical operating mechanism applicable to Dr. Dieterich's lenses. Then a combination of their patents was made and a corporation formed, further extensive studies and experiments over a period of years resulting in the "electroplane" camera which offers such startling possibilities to the photographic world today.

The lens itself is composed of four elements, one of which oscillates along the axis of the system without tilting or distortion of motion. In early Dieterich cameras the oscillation was set up by

[*Continued on page 162*]

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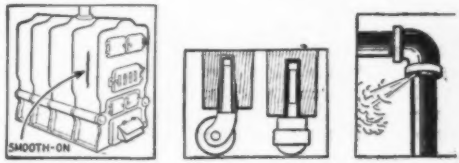

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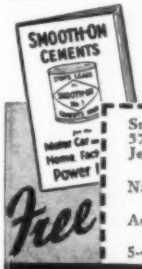

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The Shivering Lens Camera

[*Continued from page* 161]

a cam, but the "electroplane" camera utilizes electricity with a control designed by Mr. Smith, which permits 13,200 movements of the lens a minute. This lens and its driving and locating components have no frictional contact and it is therefore a "floating" structure.

Rather than enter a technical discussion here, look at this new lens and what it does in terms of the human eye. Our eyes make a never-ending series of adjustments to tell our brains the position, shape, and color of objects. These adjustments are instant and automatic, and they don't last long. Psychologists have found that eyesight in effect turns on and off many times a second. Movement of the blood and jarring of walking serve to increase this intermittent seeing. However, vision seems like a continuous process because the brain retains momentarily each of the focussed sights.

All in all, a hard process for anything mechanical to emulate.

But that's what the oscillating lens—call it shivering lens the way many persons are, if you like—is accomplishing, however, Optical engineers hitherto considered it virtually impossible, and who can blame them? Lenses do not see clearly except those objects within focus, a zone comparatively shallow in depth. The shivering lens brings every object within range into clearer, sharper detail. There's no blur as when the ordinary lens is incorrectly focussed.

Some scientists and engineers are reserving judgment as to the entire success of the "electroplane" camera until tests in Hollywood are completed. The models in working operation have already convinced others. It seems clear that the "electroplane" camera is the realization of the last of three cardinal improvements—sound, color, and depth—which scientists have aimed for since the first flicker of the first movie. Sound and color have become accepted, after initial doubts and prejudices were overcome, as essentials in movie photography. Now here's depth!

"Science hasn't progressed much—they still haven't found a better mouse-trap."

Little Mae Too, Sailboat

[*Continued from page* 160]

They can be cut off on the inside of the bow and stern, or preferably, half notched into these pieces. A good elastic marine glue should be used along the keel, chine, stem, stern and on the battens. The sides are put on first and the bottom laps them. The bottom planks are neatly fitted together without caulking. Start the bottom planking at the keel and work outboard. Trim the sides and ends, and plane off the edges of the keel to the thickness of the planking.

Take the boat off the frame and turn it over. Block it up on a couple of horses, so it is easily worked on, and trim off the side plank to the sheer line (actually ¼" below the sheer line to allow for deck thickness when finished), giving plenty of angle to allow for camber.

You are now ready for your deck beams. Because the height of the mast is measured above the deck, the deck was given as much camber as was practical. From the end of the cockpit to the bow, a novel idea was used for the deck beams. The beams were cut from ¼" plywood, and on each was glued a strip of ¼"x⅜" spruce, held in place with small brads while the glue was setting. This idea worked out very well and resulted in an extraordinarily light, rigid beam. To get the curvature for these beams mark off the centerline deck heights on the body plan, and, using a string or a light batten, pass an arc through this point and the two sheer points. This will give the radius. Swing this arc with a lead pencil on a plywood board, and then another, using the same center, but with a 2" smaller radius, and cut out on a band saw. Fasten the beams in with either wood screws or rivets. Put in all the forward beams first, then put in the solid spruce beam at the after end of the cockpit. The cockpit stringers come next and the short side beams are easily attached to them. A solid spruce beam was put in aft to take the traveler. Note that some of the beams are not on the frames. To give these proper anchorage, a side frame should be put in here.

With the aid of a batten, the frames, stem, stern and side planks are given the proper bevel and made flush. The mast steps can now be put in. This is also a good time to clean out the sawdust, shavings and dirt and apply a coat of paint to the inside of the boat. It is the author's opinion that a coat of linseed oil and turpentine with a little dryer, followed by a coat of varnish is better than paint, and easier to keep clean.

To use plywood on a deck which has a double curvature is always a difficult job, but with a little patience, and the proper cutting, it can be done. On the bow section of the port side of the construction plan will be noticed dot and dash lines. These show the approximate cuts required. A strip of water-proof plywood wide enough to cover one side should be cut from an 8'x4' sheet

[*Continued on page* 164]

How We Will Capture Tokyo

[*Continued from page* 53]

by application of sufficient power at the proper place. The actual and potential forces arrayed against Japan are stupendous, including as they do, the vast weight of Soviet Russia threatening the Japanese left flank, the huge bulk of China threatening her center from the west; and the might of America clouding up from the east, while the British Empire's imponderable weight hangs on grimly to the Japanese right flank. From its left flank in the tip of the Kurile Islands of Kamchatka on the north to its right flank at Singapore the Japanese battle lines extend over six thousand miles. But that right flank is also the direction of the main Japanese attack at the moment and strikes like a curved sword, its sharp edge cutting at the Dutch East Indies along a four thousand mile front with the sword tip far to the east at the Gilbert islands.

When the enemy presses too heavily with his right flank, the only strategy is to *counter attack* on his left flank . . . as General MacArthur did on the Bataan peninsula. Our logical strategy is to reinforce and maintain a holding force in the South Pacific while developing our main attack from the North Pacific.

This has the advantage of striking along the shortest line . . . from Dutch Harbor in the Aleutian Islands to Tokyo is roughly 3,000 miles as against nearly 8,500 miles from San Francisco to Singapore.

It has the advantage of striking at the main objective instead of dispersing strength on secondary objectives, i. e., of direct attack on the enemy's most important point instead of at an outlying element of his strength; of delivering a knockout blow at the point of the enemy chin instead of concentrating upon countering the enemy's right hand punches.

How to do it? We must first dismiss any idea that all that is necessary is to drop a few bombs on Tokyo. Dropping a few bombs on Tokyo will no more win the war for us than dropping many bombs on London won the war for the Nazis. Wars today are won by the skilled coordination of military, naval, and air power used in conjunction as a single weapon, or in a succession of coordinated, hammering blows.

Our first consideration will be air power, to soften the enemy by bombing ships, coastal defenses, airfields, and knocking out his protective air force. Air power is ineffectual without bases. One of the major strategies of Japan so far has been to seize advance bases from which to launch attacks on succeeding objectives. It requires up to two tons of supplies, daily, and a force of from seven to fourteen men as ground crew to keep one plane in operation. None except the heaviest bombers with a range of 7,000 miles and an operating radius of 3,000 miles could venture from Dutch Harbor, bomb Tokyo, and return. We shall not have enough of these built to achieve effective

[*Continued on page* 165]

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EVINRUDE OUTBOARD MOTORS

(Correct Answers to Quiz on Page 78)

1. False. They are canals in the bones of the human body.
2. True. The jack-in-the-pulpit is a plant of this type.
3. False. A kitchen midden is a refuse pile left by primitive people of past ages, usually consisting largely of shells used as dishes, etc.
4. True. Brass is an alloy, and is not found in mines.
5. False. It's the place where clothing is stored.
6. False. The word was probably derived from the word "limp," as blimps have no rigid framework in the envelope.
7. False. It's the microscopic study of animal and vegetable tissue.
8. True.
9. True.
10. True. In London.
11. True.
12. True. It's called firn snow.
13. True.
14. True. After the parachute is "retired" it's still used sometimes for dropping supplies.
15. True.
16. False. The differential allows the rear wheels to turn at different speeds when turning a corner.
17. True.
18. True. The Vultee Vanguard is one.
19. True.
20. True.
21. False. Grain alcohol is not made from wood.
22. True. An optical illusion causes the lens of the eye to see stripes of certain colors as if they were wider than they really are.
23. True. Biplanes are rare in modern warfare, but the Swordfish is one of the few still in use.
24. False. It must turn at high speed.
25. False. It is named for its inventor.

Attention, MI Readers!

We will pay $1 for each true-false statement which we find acceptable. Statements will not be acknowledged or returned. Address the Quiz Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

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A plant to produce vitamin-fortified oils is to be built in Richmond, Calif.

Aiding defense, fishing tackle companies are producing delicate machine parts.

Little Mae Too, Sailboat

[*Continued from page* 162]

of ¼" plywood. If 12' sheets are available, they will eliminate the necessity of a splice, which is required when 8' sheets are used. Lay the cut piece of plywood on the beams with the forward edge even with the stem. Bend it down over the frames along the cockpit. Clamp it there and try to bend the forward end down; it will immediately become obvious that a section will have to be removed. If the cut shown on the drawing is made, it should be an easy matter to bend the board into place, and the piece cut out, with a little trimming, can be reinserted. Fasten the plywood to the beams with ⅝" No. 6 flat head wood screws, through the flange on the beam. When the outside pieces are on, work toward the center on the forward deck, being careful to pull the edges down tightly. Leave a space of about 4½" at the cockpit, and 3½" at the bow, along the center of the boat. If 12' boards are used, it will be easy to fill in across the after end of the cockpit, but if 8' boards are used, a splice is necessary to fill out the stern. This can be made by putting an 1½" strip of plywood under for a butt block, and fastening with clinched copper tacks.

The forward end of the deck is covered with heavy unbleached muslin. Lay this in marine glue or canvas cement. Stretch the muslin over the opening along the center, but not too tightly; then down over the deck and tack along the edges. Now cut a piece of ⅜" thick mahogany to fit the opening in the deck, and with the lower edges well rounded so as not to cut the muslin, fasten it in the recess. This makes for a tight covering job, and sets off the plain deck. A similar opening can be left in the after end of the deck, and a similar piece of trim inserted. Battens can be used under the seams aft if it is desired. Cut the hole for the mast, and the deck is finished.

The cockpit and the sheer trim should be of mahogany and are shown on the drawing. A brace on the centerboard trunk and a 12" board down the center of the cockpit for a floor finishes up the woodwork on the hull.

The mast and the boom are conventional and need no explaining other than the plans. Remember, the secret of any glued mast is to use a good casein glue (cascamite) and use it *exactly* as the manufacturer recommends, with plenty of clamps to hold the pieces together while the glue is setting up. While the idea of running the halyards down inside the mast is not novel, it may be new to some of the readers, and to these a helpful hint is to place a piece of twine in the mast, and out over the sheaves before the mast is glued up. This will save a lot of fishing afterward. If the sails are available, they should be tried in the slot before gluing. If they are not available, the sizes indicated on the drawing should handle them nicely.

The centerboard is straight-grained spruce,

[*Continued on page* 166]

How We Will Capture Tokyo

[*Continued from page 163*]

results in the time required. These distances are also too great for the employment of supporting fighter aircraft and dive bombers, all essential to the job.

On the other hand, with advance bases at Petropavlovsk on Kamchatka Peninsula, the distance to Tokyo could be shortened to roughly 1,400 miles, a convenient radius for our B-17 planes.

From Soviet-owned, northern Sakhalin Island our bombers would have only 1,050 miles one way to the Japanese capital, which is within effective range of our B-26 and B-25 bombers.

From Vladivostok the distance is only 665 miles to Tokyo, which is thus within striking distance of our P-40 fighters and A-20-A attack bombers.

Getting our heavier planes to Siberia would be a problem of flying them to Alaska via the string of airfields now being constructed through Canada, and in Alaska, and flying them across the narrow waters of the Bering Sea to Siberian bases. Personnel and supplies could be flown across by our new C-46 transport planes now going into production, planes capable of carrying 50 men or an equivalent weight of machinery and supplies. Ferrying operations would probably be impracticable during many weeks, due to storms and fogs; but advantage could be taken of intervening favorable atmospheric conditions to accelerate these ferrying operations. Starting operations with an initial 500 bombers, the bombing rate could be stepped up day by day until Japanese installations are thoroughly softened up for the next phase of operations.

Bombing from Siberian bases would require the acquiescence of the Soviet, now occupying a status of non-belligerency so far as our war against Japan is concerned. The Soviet will put off engaging Japan on her rear as long as possible but it is highly probable that Japan will attack Siberia eventually.

Negotiations should immediately be started with Moscow to guarantee them reinforcement of the Soviet eastern flank with men, guns and planes transported via Alaska and Siberia in return for bombardment bases against Japan, the implacable enemy of the Soviet as well as America.

In case these negotiations should fail, use could be made of at least 500 long range Russian bombers now in Siberia. By an agreement under the Lend Lease Act, these planes could be transferred to U. S. ownership and flown from Chinese bases against Tokyo by American fliers. Failing this, there exists the strong chance of our leasing Kamchatkan and Sakhalin bases from the Soviet for a limited period, under terms of the Lend Lease agreement and somewhat in the fashion we leased the Atlantic bases from Britain prior to our entry into the war.

Otherwise we would have to speed up the

[*Continued on page 166*]

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How We Will Capture Tokyo

[*Continued from page* 165]

building of long range bombers and fly them across the Atlantic, Africa, India and to the Far East to operate from Chinese flying fields.

However, circumstances point to early and rapid cooperation of the Soviet and American forces against their common enemy, the Japanese, and it probably needs only an assurance of the arrival of sufficient American strength on her territories to win Soviet cooperation.

Now as to the necessary naval operations: These would be preceded by naval air operations aimed at Japanese fleet units and harbor installations. A succession of attacks at widely separated points by our Fleet units in the mid-Pacific and South Pacific to divert Japanese naval forces to the southward would probably precede strong naval action in the North Pacific. Such naval action would be preliminary to convoying our military forces to the mainland of Asia. Again, presupposing the cooperation of the Soviet, these could be landed by air transport and by sea to establish strong bases on the Siberian mainland. Siberian roads have now been pushed far toward Bering Strait, which is only some 65 miles wide at its narrowest point. These roads could be extended and improved by the mass labor methods of the Soviet in short order, while equivalent American

[*Continued on page* 167]

"Jones certainly is a ski enthusiast—he never gives up."

Little Mae Too, Sailboat

[*Continued from page* 164]

made as shown in the plans. There is no apparatus necessary to raise or lower the board. A small wedge, notched to fit the after end of the board, and dropped into the box, will keep the board in any desired position. Streamline as shown on the plans.

Make the rudder from spruce and dowel together to prevent splitting. The tiller is also of spruce, and is long enough to allow the skipper to move around and trim the boat. The tiller is fastened to the rudder by two brass straps which are bent over the tiller and riveted to the rudder. It is kept in place by a ¼" brass rod which goes through a hole in the tiller, then down through a hole drilled in the center of the radius of the leading edge of the rudder. Notches are cut in the rudder to take the gudgeons, and the rod holding the tiller goes through holes in the gudgeons. In this way the tiller is held and the rudder is swung from one pin. The gudgeons are made of galv. iron strip 1¼" wide, bent to suit and are fastened to the stern with wood screws.

Standard hardware is used throughout on the rigging. In the Hardware List, the most suitable type of fittings is listed.

While the sail can be made at home, it is best to have a sailmaker take care of it. In the long run, the sailmaker's job will probably save money, and remember, if you want to win races, it is a lot easier if your boat is as good or better than the other fellow's—sails are a big factor.

Lumber and Hardware List

Sides—2 pieces w. cedar, ⅜"x8"x12'.
Bottom—6 pieces w. cedar, ⅜"x8"x12'.
Keel and Keel Batten—1 piece spruce, ½"x10"x12'6".
Frames, Deck Beams, C. B. Box—1 piece spruce, ⅝"x10"x16'.
C. B. and Rudder—1 piece spruce, 1"x12"x8'.
Mast—2 pieces spruce, 1"x3"x18'2".
Boom—2 pieces spruce, ½"x4"x10'.
Trim—1 piece mahogany, ⅛"x10"x6'.
Tiller—1 piece spruce, 1¼"x1½"x4'.
Deck and Deck Beams—2 pieces marine plywood, ¼"x4'x8'.
Sheer Moulding—2 pieces mahogany, ⅝"x1"x15'.
3 turnbuckles—feige type for ⅛" wire.
3 jaw end sockets—feige type for ⅛" wire.
45' shrouds and forestry—⅛" dia. 1x19 airplane strand.
1 sheet traveler—⅝" rod—18" wide—6" high.
1 gooseneck—sliding type for ⅝" track.
12" track for gooseneck—⅝" sail track.
1 mooring eye—⅜" dia. shoulder eyebolt 2¼" long.
3 chain plates—1"x⅛" plate x 7" long.
1 set shroud tangs—with bolt—omit thimbles.
1 fore stay tang—omit bolt and thimbles.
2 rudder gudgeons—make from No. 16 ga. x 1¼" strip.
1 rudder pin—¼" dia. rod 9" long.
2 tiller straps—make to suit from No. 18 ga. plate.
2 mast sheaves—1⅛" dia. x ⅜" thick, ¼" pin.
2 sheet blocks—swivel eye single for ¼" rope.
1 sheet block—fixed eye single for ¼" rope.
2 boom travelers—for ¾" to 1" boom.

Large scale blueprints are available for *Little Mae Too*. Address Fawcett Publications, Inc., Greenwich, Conn., enclosing check or money order. Order by number, 983, price $2.00, postpaid.

How We Will Capture Tokyo

[*Continued from page* 166]

roads were being made available on the Alaskan and Canadian sides.

Japan has some 20,000 men in Japanese Sakhalin, about 700,000 in Manchuria and about two divisions in Korea. The Soviet Siberian forces consist of about 500,000 men, who have already proved themselves superior to the Japanese in border clashes. This Soviet force, strengthened by American guns, tanks and planes and an American expeditionary force of 200,000 men, could drive the Japanese out of Manchuria, Sakhalin and Korea, using the Chinese and Korean hatred against their Japanese masters to secure uprisings in Manchukuo and Korea that would aid in defeating the Japanese army forces in those areas. Simultaneous attacks by the Chinese armies in China proper would immobilize the approximately 700,000 Japanese forces now holding a precarious tenure on those areas.

The all-out final attack on Japan would be preceded by a steady wearing down of Japanese air, naval and military forces in the South and mid-Pacific areas. It would come after a long bombardment of Japan by twenty-four-hour passage of heavy bomber forces overhead, moving with the regularity of express trains and shuttling back and forth, unloading their cargoes of high explosive and demolition bombs on the crowded bamboo and paper shacks of Japanese cities until seas of flame sweep from one end of the islands to the other. Army and Marine Corps parachute and airborne troops would simultaneously be seizing outlying Japanese islands, like the Lu Chu group on the south and the Kuriles on the north, with forces of Marines landed from barges to set up air fields. Naval aircraft from carriers would be bombing Japanese warships, submarines torpedoing them, and heavy battle divisions hunting down the Japanese main fleet.

Steel crested waves of Soviet and American soldiers would be surging down the Korean peninsula, poised and threatening on the shores of the Asiatic mainland. The actual landing of troops on Japan might not be necessary, until the final phase of air and naval action had been accomplished and the Japanese had sued for peace. The threat of the landing of armed men would probably be enough. But, if necessary, combined American and Soviet forces would be landed at all principal beaches and ports to converge in swift-striking columns at Tokyo itself. With the seizure of the capital the spider of Japanese militarism could be smashed once and for all.

Until we attack Japan in her home islands, she will continue to distract and disperse the forces of the United Nations. The sooner we attack Tokyo the better, if for no other reason than that Japan, after luring our strength into the South Pacific, may strike swiftly, suddenly and devastatingly at our vulnerable northern flank, seize Alaska and establish bombing bases against San Francisco and Detroit.

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Mechanics Plus Genius Equals Art

[*Continued from page* 60]

constructed the forerunner of the modern camera boom.

The next of DeMille's important mechanical contributions to the industry came shortly after Hollywood was turned topsy-turvy by the advent of sound. As DeMille started the production of "Dynamite" for Metro-Goldwyn-Mayer, his first picture in the new era, he walked onto the set to find the camera enclosed in a glass box stationed at a position roughly equivalent to a $3.30 seat in a Broadway theater.

"I looked at the camera in its glass house," he recalls. "I might as well have been back in New York producing stage plays. This was no way to make motion pictures for all I could do was make act one, act two, act three and turn my affairs over to my attorney for quick liquidation."

But DeMille never quit without a fight. "Take the camera out of that greenhouse and set it on the stairway," and he pointed an imperious finger to the left.

"But Mr. DeMille, it can't be done."

This phrase from the cameraman was like a red flag before a bull. "Get the camera out of there and set it on the stairway."

He laughs now as he recalls the expression of those on the set. "Many of them had known, privately, that I was crazy. And this was public proof."

DeMille had sent the property man for blankets. He wrapped these around the camera.

"We tried the camera," he continued, "but the sound man said he still could hear the noise from it in his recording instruments. He admitted, though, that it was less noticeable than he had expected.

"I sent for more blankets and some heavy quilts, wrapped these around the camera until it looked like a dinosaur's sore thumb. Again we tried the camera; this time the noise was negligible."

This was a practical demonstration that it could be done, and Douglas Shearer, sound department chief, worked DeMille's rough idea into the first "blimp" which today permits a camera to be moved about the sound stage regardless of the location of microphones.

Although the blimp, effect lighting and the camera boom aided the industry more than any other of DeMille's mechanical contrivances, he has led the way in the creation of spectacles or mob scenes which have given pictures a field of operation beyond the reach of the legitimate theater.

His desire to produce super scenes, such as the parting of the Red Sea in "The Ten Commandments," may be traced to a frustration which goes back to 1917 and reveals DeMille as a pioneer in airplane transportation.

This adventure started in 1917 when DeMille

[*Continued on page* 169]

Testing The Fit Of Screws

[*Continued from page* 125]

rough guides because they do not take into consideration the grain structures of different kinds of woods.

Cut off some small pieces of planking and of frame, chine, keel, etc., sections. The hole in the part to be fastened should be large enough to pass the entire length of the screw when the latter is pushed through *by hand* with a moderate amount of pressure. Now try several sizes of drills for the threaded part of the screw. Do not drill clear through the bottom piece of wood, but leave about ¼ inch for the thin point of the screw to bite into. Also, try different depths of countersinking for the head. If the bottom hole is too large, the screw will churn around; if it is too small, the bottom piece of wood will split, or the screw itself will snap off as you continue to apply turning effort. Incidentally, much better control over the screw is exercised with an ordinary screwdriver than with a screwdriver bit in a brace. The latter permits too much leverage to be exerted, and screws will either snap off needlessly or the thin edges of the threads will grind out the wood into which they are biting. Deliberately force a couple of screws to the breaking or loosening point, so that you will know how far to go on the boat itself.

The same screw will require surprisingly different treatment with different kinds of wood. Long leaf yellow pine, used for keels, is pretty soft, and screws can be turned in tight almost without any root holes at all. Mahogany is much firmer, and holds the threads very nicely. Oak chines are like iron, and need much larger holes than for other woods.

Kitchen "Reminder"

[*Continued from page* 144]

The center teeth should measure about one inch, and gradually become smaller toward the ends of the mouth.

Brads are used as pegs for the teeth. A piece of plywood is attached to the back of the board to cover the mouth, and in this, holes are drilled to receive the brads that are in each tooth. Holes are also drilled in the bandanna to receive the teeth when they are removed.—*F. C.*

ANSWERS TO CRAFT TEST ON PAGE 141

1. Combination square with bevel protractor
2. Feeler gauge
3. Micrometer
4. Steel tape rule
5. Caliper rule (slide caliper)
6. Dividers
7. Outside caliper
8. Inside caliper

Mechanics Plus Genius Equals Art

[*Continued from page* 168]

bought a smashed up Curtiss "Jenny," had it fixed and learned to fly it. He then formed Mercury Aviation company which flew passengers from San Diego to San Francisco, a distance of about 600 miles.

"This," said DeMille, "was the first airline passenger service to be maintained over a regular route."

It seemed for a time that DeMille might desert the flicker for the flying business, and his interest in aviation was so keen he took friends up whenever he could get them to the airport. Among those who had their first ride with DeMille at the controls were Sam Goldwyn, Adolf Zukor and Jesse Lasky.

Finally DeMille was persuaded to get out of commercial aviation and devote his energy to pictures.

"What finally grounded me entirely," he explains, "was the line of Paramount executives at the airport everytime I took off. At first I thought they liked to watch me fly, but I soon learned they were lining up like sprinters ready to dash to the phone and start selling Paramount stock if I cracked up—for in those days I often was in the middle of a million dollar picture."

When DeMille's concern for the anguish of his associates forced him from the air, he took to the financial skies, writing expensive scenes into his production until at one time he was labeled "the bathtub king" for the lavishness of the bathing scenes he created.

But more lavish than anything created within a studio to set off the classy chassis of an actress was the spectacle he created in "The Ten Commandments" where he parted the Red Sea.

That scene really was "colossal." Five hundred chariots drawn by 1,000 horses swirled toward the camera, pouring out of a massive gate 125 feet high. The doors on this gate were 60 feet, the highest ever constructed for a motion picture scene.

The parting of the Red Sea was comparatively simple, but closing it again was a problem for DeMille. Nothing available would create a wave of sufficiently awesome size, so DeMille designed a scoop, placed it beneath a 50,000-gallon water tank, and dropped water upon the scoop. By changing the curve of the scoop the wave could be made to either go high into the air, or flung almost parallel to the ground. (This scoop idea is used by all the studios today, especially in sea pictures.)

His parting of the Red Sea still is unsurpassed for spectacular ingenuity and dramatic effectiveness, although DeMille believes he has created a close second in "Reap the Wild Wind," released throughout the country early this spring.

In this picture an undersea battle between two

[*Continued on page* 171]

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CRYPTORITHMS

The New Crossword Fad in Figures

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Every letter used in a cryptic problem represents a number. There is a different letter for each of the ten digits, counting from 0 to 9, or from 1 to 0(10). When these ten different values are discovered the key will appear as a ten-letter word or phrase, starting with the letter signifying either 0 or 1, as the case may be.

These equivalents, when discovered should be written in *immediately* all through the problem, and in the key order. That is, if you determine that a letter, say A, stands for number 4, you must immediately write 4 under every A in the problem, and write A under number 4 in the key row, to spell out the key word or phrase.

CRYPTORITHM No. 13. An Addicrypt. Key:
1 2 3 4 5 6 7 8 9 0

A, H E M, A N C, A P T.
H, E A T, E M Y, Y A M.

T Y, M T A, H O C, N O P.

HINTS: Col. 11: T is 1; the only "carry" possible.

Col. 1: T+M=P. (1+M=P). P must be just 1 more than M. So jot a memo that P follows next after M somewhere in spelling the key; thus, MP.

Col. 7: M+T (1)=A. Here A must be either 1 or 2 more than M, depending on whether or not there was a "carry" of 1 to this column from col. 6. But we know already that P is 1 more than M, per memo MP, so A has to be 2 more than M; thus MPA will occur in our key.

Now, analyzing cols. 3 and 4 together, we find that Y can only be zero (0). Knowing that, col. 3 shows N to be 1 more than A. We now have MPAN, also T and Y for first and last letters of the key.

The finish is too easy for Crossworders and Anagrammists! It is hard mathematically, though! Try it.

CRYPTORITHM No. 14. A Multicrypt. Key:
1 2 3 4 5 6 7 8 9 0

R A I S E O L D
C H E E R
H H I I S L O R L
L L S S O D I A
L L S S O D I A
R A I S E O L D
E R H S H O A L O

E R I L E R L E L H A H L

HINTS: 4th multiplication: RAISEOLD×H= RAISEOLD. H is 1.

1st mult.: RAISEOLD×R=HHIISLORL. The last two digits in this product are HH (11), and they represent R×R with a "carry." R must be 3.

2nd and 3rd mults.: If the Multiplier, E, were anything but 2, then the last multiplication, E×R (3), would equal 10 or more and thus would stretch these products to 9 digits each, instead of 8. So E is just 2.

Col. 2: R (3) +A=H (11). A=8.

2nd and 3rd mults.: At left end, RA (38) ×E (2), will give 76 or more. So LL must be 77. So L is 7.

Too easy, the rest! If you want some harder ones, send me a return postal card or envelope for them.

Solutions to Nos. 13 and 14 will be published in MECHANIX ILLUSTRATED for June. Address answers to NINE-HEX, care of MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

The key words for April were:
No. 11: Submarined. No. 12: Capt. R. Jones.

Canny Comforts For Campers

[*Continued from page* 133]

surface, and delivers quickly. Another ardent little performer is the charcoal heater in Fig. 2, which I found melting the North Wind's icy fingers as they pried at every chink in a fisherman's shanty on Lake Champlain. The top of one can is cut off about 4" down and the paneling hammered out so that it can be refitted as a removable cover. The legs that lift the heater clear of ice or floor are cut from about 4" of the bottom of another can and bolted or riveted in place as shown. With such a heater for companion, and a supply of oak, beech or maple charcoal, you can watch your tip-ups for happy hours without freezing your marrow.

And if you're one of the fast-growing host of charcoal cooks, you'll be interested in the grill shown in Fig. 3, fashioned this past summer by a Maine lumberman who returned from the city with some "dude" ideas. They all laughed at him until they sat down to his charcoal-broiled steak. Note that there are three heights at which the broiler may rest, according to the draft, other demands on the cook's attention, and the thickness of steak, chops or hamburgers that are soaking in that good hardwood essence—yum! If you make and use either of these charcoal burners, don't waste fuel as is too commonly done; a couple of inches of lump charcoal or one layer of briquets is ample for more than an hour's steady, intense heat.

Economy—of packing space and cooking energy—is the keynote of the portable outfit in Fig. 4, devised by a wandering witch-hazel distiller I once met up with. Neatly nested inside he carried not only his grid and simple cooking utensils, but a goodly rainy-day hoard of birch bark and fat pine for tinder. The four-sided fire-guard, its adjustable opening placed to windward, actually improves an open fire and concentrates its heat on the beans. And when you've stowed your vittles, it's mighty comforting to widen that opening and toast yourself in the steady glow jealously directed and reflected away from the great outdoors to you.

Speaking of reflected heat—for food-baking purposes—there's the reflector oven illustrated in Fig. 5, which I found performing in a cabin in the Great Smokies. Put your bannock, pie, meat or fish on the grid, place the oven on ground or hearth about a foot from a clear, bright fire, and you'll get clean, even baking results that no bought outfit can beat.

You don't need an elaborate kit of tools to adapt these cans, although shears, cold chisel, flat-nose pliers and file or whetstone will simplify matters. Some of the old-timers get along famously with nothing more than an old-fashioned can opener and a bit of brick with which to rub down knife-sharped edges. For added safety, and strength, plan for turned-over edges, or hems, wherever possible.

Nor do you need any special ingenuity. The boiler shown in Fig. 6 is simplicity itself, but what a versatile trailmate it is! I've found it catching rainwater in the Painted Desert, holding generous gallons of hot water for many a camp laundry, many a pair of pavement-tendered dogs, not to mention warming up feed for huskies and food for masters in the Yukon. It's just the thing for safely and speedily heating a tent, or drying it

[*Continued on page* 172]

Mechanics Plus Genius Equals Art

[*Continued from page* 169]

divers and a giant squid takes up an entire reel. It was shot in an underwater set 100 feet long and more than 25 feet deep. The mechanical monster is horribly realistic as it grabs divers, tears at their bodies and air hoses, and for the $100,000 it cost to build, the squid should be realistic.

DeMille is very proud of this underwater scene and considers it the most effective he has produced, if not the most spectacular. His judgment may be warped here, for he has a keen personal interest in underwater scenes and underwater sports, growing out of his hobby of walking on the bottom of the sea off the California coast, a recreation he has enjoyed for many years.

His equipment on these strolls consists of a helmet weighing 60 pounds and 80 pounds of additional weights attached to his chest. He does NOT carry a compressed air tank, but has pumping equipment in an accompanying dory since he seeks out kelp beds for his walks as other men choose forests, and it is essential to have help at hand should he become entangled in the "jungle" on the ocean floor.

One reason he is fond of this sport is that on the bottom of the sea he is treading uncharted paths, placing his feet where no one ever stepped before. He gets the same exhilarating pleasure from being the first man upon the scene as he does from accepting the challenge of more conservative men who attempt to stop him by saying, "Mr. DeMille, it can't be done."

Will We Come To This?

[*Continued from page* 61]

rolling with an unending supply of fuel and lubrication. But when victory depends on these machines, the government, if necessary, naturally is going to be as tough about civilian use of gasoline as these photos prove the ruthless Germans have been in France.

Makeshifts and substitutes the ingenious French have resorted to are worthy of study, therefore, because we may come to them before the war is over.

Many of the contrivances hopefully devised to replace gasoline-burning engines have failed to operate at all; many have proved workable but more expensive than those to be "replaced"; a few have turned out to be evolutionary developments which without the spur of gasoline scarcity would perhaps have not been realized for years. One of these is the new alcohol carburetor, invented by Raoul Ghezzi of Monte Carlo, and termed a trail-blazer for a new epoch in motor transportation. The inventor asserts that by installing his carburetor an automobile will run on alcohol or gasoline as wished.

But most Frenchmen who want to continue to

[*Continued on page* 172]

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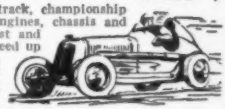

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Will We Come To This?

[*Continued from page* 171]

use their cars, or who are dependent upon a bus, taxi, truck, or agricultural machine in order to make a living, vie with each other to find new means of making gas engines independent of petroleum supplies. As a result, strange-looking vehicles in the streets and roads of occupied and unoccupied France are becoming commonplaces these days. Most numerous are those vehicles—from once-elegant cabriolets and smart limousines to utilitarian busses and delivery trucks—driven by power generated in kettles located on the rear of the chassis or on one-wheel trailers. Many busses using these kettles require a stoker to keep the power up. Shades of the famed American pioneer auto, the Stanley Steamer!

Cigar-shaped tanks painted black and set into the tonneau of a shiny coupe show that its owner is driving with acetylene gas power and tries to make the tanks look like futuristic rocket bases. Agricultural machines like the charcoal-and-ammonia powered tractor shown on page 80 of the April issue of MECHANIX ILLUSTRATED are more concerned with getting plenty of power at low cost, than with keeping up looks.

Of course, Europeans who never owned a car or are not otherwise concerned in efforts to keep using gasoline motors in a gasolineless civilian life, keep getting around on the bicycles which have been relied on for generations. Although nearly every family on the continent is owner of one or several bicycles, the new demand for them (due to combined lacks of auto-fuel, metals, and rubbers) has caused pre-war prices of 300 to 500 francs for a bike to jump to 1,500 francs—and none to be had even at that level!

That fact has particular meaning in the United States, where today bicycles are being bought by persons who previously thought of them mainly as a toy or sport equipment for adolescents. With metal and rubber scarcities limiting production of even the economical "Victory bike," it may become impossible to supply the suddenly-accelerated demand for "wheels" from persons deprived of the use of their cars because of the gasoline and rubber shortages. (See "Back to the Bike" on page 101 of this issue.)

Delivery by horse-drawn vehicles is again being adopted by merchants in many communities of the United States who thought they had changed to trucks permanently; and Dobbin finds himself looked at with respect and even fondness on many farms which had relegated him to a back stall in order to make room for a big-tired tractor, truck, and passenger car. Since the equine population of the country has been steadily declining, the circumstances are likely to create a sharp gain in horse values. That's happened in France, where a good horse could be bought only two years ago for no more than 2,000 francs. Today an old mare, veteran of harsh service drawing a cab, brings from 20,000 to 24,000 francs!

Canny Comforts For Campers

[*Continued from page* 170]

before packing. Simply dig a hole inside, dump into it half a boiler-full of live coals free of burning, gas-producing wood, turn the boiler upside down over it for a radiator (Fig. 7) and seal the edges with earth.

You can even refrigerate your food with one! You've probably used one of the packing-case cupboards shown in Fig. 8; I've seen hundreds of them dangling at camp sites throughout the country. But they don't keep butter firm, food fresh.

Knock out the bottom of the packing case and set a boiler filled with water on top. Cut drop curtains out of burlap, wet them, weight the lower ends with sticks and the upper ends, submerged, with a couple of stones. It'll take a mite more muscle to haul things up out of reach of four-footed prowlers. But evaporation from the wick-like burlap will pull heat out of your cupboard's interior, refrigerate its contents.

You'll want to rustproof the tin in this instance; a couple of coats of clear lacquer will last for years. Take along some lacquer thinner, too, the next time you pack in to the tall timber. It's ideal for removing the greasy soot produced by the average resinous campfire. If white water claims your duffel, and you make any of the emergency utensils shown in Fig. 9, scald them after using, dry them quickly before the fire, and they'll last a long time. You'll want them to. They're excellent for supplementing regular camp gear, chiefly because of their two-fisted capacity. That pail not only totes well, and generously, but pours accurately—matters of prime importance when the water supply is over the hill.

And if, having gotten yourself back close to nature, you hanker after a few "dude" refinements, there are still culinary corners of this big can that we haven't turned. Fig. 10 may look like a freak gadget, but its a thoroughly practical self-draining bacon griddle, invented by a forest ranger friend who likes bacon. He likes it, however, free of the ghostly memory of fish, egg, onion and what-not that seems to ooze out of the very pores of his overworked fry pan. That quick-heating tin has cleanly crisped many a flitch for him, and talk about domestic economy! Every ounce of untainted dripping has been neatly caught, to be saved to shorten bread and biscuits!

Lamps That Gleam

[*Continued from page* 130]

snap on the current. This usually does the trick neatly. A frame of four iron rods and bands painted black supports the wash-basin roof of the post lamp, which also should be painted black, or perhaps Chinese red. The Rhinewine bottle will require a long, narrow bulb obtainable at any electrical supply store. For the lamp (in the center) with the black bands a large fruit or coffee jar will be necessary, inasmuch as the ordinary light bulb is too large to pass through the mouth of the standard Mason jar. For a bright light focused on a small area, make the outdoor plywood spotlight. The tin lantern is simply made and invites bright coloring.

The Real Truth About Rubber

[*Continued from page 72*]

But it needed more than a magic touch to compete with the rapidly expanding plantation rubber industry—an industry that finally settled down in the jungles of Malaya, the East Indies and other corners of the earth far removed from the Brazil that mothered the original trees which later stocked the Far East plantations.

Years ago, Brazil was the undisputed king of rubber. Rubber trees grew wild up the Amazon river. Slave labor tapped the trees. Natives, French, Spaniards, English adventurers became rubber millionaires, built great palaces in the jungles and lived fabulous lives.

But modern scientific methods killed off the Brazilian rubber millionaires. Seedlings were carried out of Brazil to the Far East and planted on plantations, where rubber could be produced much more uniformly and much more cheaply than it could be produced in the wild state. The short-sighted Brazilian rubber men failed to keep step with the new methods—and Brazilian rubber disappeared from commerce.

Eventually, attempts were made to remedy the situation. Rubber seedlings of high-producing strains were imported from the Far East to Brazil and set out on Brazilian plantations. But then a strange thing happened: The Far East offspring withered and died of diseasc in their progenitor's native Brazil!

Long years of research and experiment were needed to develop a new disease-resistant strain.

Archie Johnston, manager of the Ford rubber properties in Brazil, told about it recently in Detroit.

"We know," he said, "we can grow rubber commercially in the western hemisphere. We know it now. We have had some hard nuts to crack, but it is safe to say that we have whipped all the problems—except that of labor."

He told how disease resisting tops were grafted on the roots of the high-production Brazilian trees. The grafting was successful; and on this new strain hangs the hopes of this country to become independent of Far Eastern rubber .

But it will take twelve years! Twelve years hence, said Johnston, plantations on this side of the globe will be able to supply as much rubber as we need today.

The United States and fifteen other countries are working to make rubber growing successful in this hemisphere. Down in Florida there is a 150-acre tract of land—the U. S. Plant Introduction Station near Miami—on which will be produced some 90,000 rubber saplings each year for transplanting in Central and South America.

Under the direction of H. F. Loomis, associate agronomist, the plant scientists have grafted and pruned, crossed and recrossed, until today they have raised the rubber yield of their original trees tenfold. Where one tree produced but three

[*Continued on page 174*]

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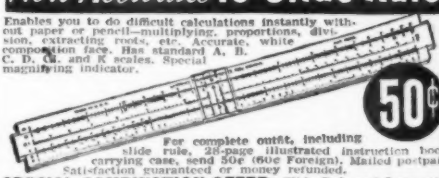

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The Real Truth About Rubber

[*Continued from page* 173]

pounds of dry rubber (latex), they have been able to develop trees capable of producing 30 pounds.

But the vast American plantations made possible through the work that has already been done are still, more or less, "on paper." If the saplings were in Central and South American earth today, it would still take years of growing before their rubber reached our processing plants.

So why laugh at the lowly rabbit brush?

The shrub has a lot of other cousins besides guayule growing in American soil.

The rubber from the rabbit brush is called chrysil rubber, a name derived from the shrub's title in the botanical lexicon—Chrysothamnus. If that is Greek to you, it means "golden bush"—in Greek.

In the same "family" are the beautiful and much maligned golden rod, the aster, the stately sunflower and the hayfever victim's scourge, the insidious ragweed.

No specific data concerning the rubber content of this last particular weed are available—but it is just as well. Army morale could hardly survive the discovery that the driver of a reconnaissance car was allergic to a spare tire.

Seriously, there is no doubt that the rubber situation is a tough one—and serious consideration should be given to all aspects of the problem—including the claiming of rubber from all natural sources. Doubtless some of them are impractical. But when you consider that, even with all civilian use of rubber stopped, the present stockpile of crude is enough for less than two years of military requirements, impracticability becomes of less importance.

There apparently is the official feeling that other sources will ultimately provide for our needs, for some of the stockpile is being released for civilian use. Women have been told not to worry about girdles—that they will always be able to get their "two-way stretch" garments. The official opinion is that such a supply will bolster morale (too). Reclaimed scrap is going into civilian use, too—for how long, no one knows.

Ultimately—perhaps by 1944—our manufacture of synthetic rubber, coupled with South American imports and reclaim, will provide all that is necessary for war. It will probably provide for many civilian needs, too.

For right now, the country is engaged in a vast expansion of the synthetic rubber industry. Two huge businesses are being combined in the effort—oil and rubber. And this is the biggest bright spot in the U. S. rubber picture today.

New plants are rising. Processes are still being refined. Some are in actual production—and were in production even before Pearl Harbor and the expanded defense program.

Their chief source for the synthetic—and ap-

[*Continued on page* 175]

Year-'Round Sport Shack

[*Continued from page* 138]

use of rough lumber. Old brick are used for the floor, laid in basket-weave or herringbone pattern, and the fireplace is built of the same material. A second-hand sink serves the purpose just as well as a new one, and windows from the wrecking yard are entirely satisfactory. Roll roofing is easy to lay and low in cost. Hardware for the barbecue can be picked up in a junk yard.

The structure should rest on a concrete footing in which anchor bolts have been imbedded, and the framing built up of corner and door posts, 4"x4" rough lumber, the remainder of the skeleton of two-by-fours, including rafters. A built-in bench, as shown in the plan, will seat four or more persons, and the table could be made with folding legs so that it would lay flat against the wall under a shelf, shown on the right in the plan view.

Water connections for the sink are reduced to a minimum by having a hose connection on the outside, to hook up with the garden supply, and the sink drain can be carried off on to flower beds or shrubbery. Inasmuch as the sink would be used only occasionally, there would not be enough waste to accumulate on the ground for any length of time.

With the fireplace opening in the center for warmth, the barbecue is built in a side wing. Note that it is equipped with three pairs of rails or angle-bars at different levels, so that a removable grate can be raised or lowered to suit the fuel used—charcoal should be just below the grill or hot plate, hard coal below that, and wood on the lowest level, a permanent grate consisting of pipe embedded in the brickwork. These pipe, half-inch size, should be spaced about one inch apart. The same type of grate is used in the incinerator in back of the chimney. A large lid or door should be used on the incinerator to admit large bundles of twigs and leaves. The flue enters the main chimney above the smoke shelf, as shown in the sectional view. Incidentally, this fireplace is proportioned according to dimensions recommended by experienced architects, and is insurance against smoking.

Window boxes and a trellis will liven up the structure—which should be left to assume a mellow, weathered tone. The trellis is made simply by adding horizontal battens to those over the seams between the boards.—*Hi Sibley.*

Lathe-Turned Cooky Barrel

[*Continued from page* 136]

barrel with ½" dowels. The handle and locked bail are shaped from 5/16" copper tubing and No. 2 copper wire. Note the small spring running through the copper tubing, either end being attached to the ends of the wire hooks, to furnish proper tension to keep the lid on snugly. The holes drilled in the rollers on both bail and handle should be of a size to make the rollers fit snugly enough to stay in place.—*B. N.*

The Real Truth About Rubber

[*Continued from page 174*]

parently the source on which the planners pin their faith for future production—is butadiene derived from "cracking" petroleum. It is the base for Ameripol, the synthetic being produced by Hydrocarbon Chemical Co., joint subsidiary of Goodrich Rubber and Phillips Petroleum. Butadiene is the base for nearly all the synthetic rubbers manufactured by different processes.

We have plenty of oil, and it has been estimated that by utilizing only 1 per cent of our oil output, enough synthetic rubber could be made to meet all our needs.

But should our oil supply become so precious—should we require every drop possible to operate our bombers, our tanks and the other machines of war, there is still another vast storehouse on which we could draw to meet the needs of synthetic rubber manufacture.

From 5 per cent of the average annual crop of 2,500,000,000 bushels of corn can be made the average annual rubber requirement of 600,000 tons, says Leo Christensen, of the University of Nebraska.

Congress has been told that, too.

Inserted in the Congressional record by Representative Harry B. Coffee, is a resume of Dr. Christensen's research.

Dr. Christensen and his associates apparently took their cue from a Polish process, developed before the war, which utilized ethyl alcohol. They found that a butylene glycol would yield a better "procedure." They obtained it by fermentation of farm products containing starch or sugar—corn, wheat, sugar beets, potatoes.

After two days fermentation, the glycol is removed either by distillation or by extraction with one of several solvents, then the glycol is converted to butadiene by dehydration. The butadiene thus converted is used with styrene or with the other vinyl compounds presently employed with the butadiene extracted from petroleum.

Dr. Christensen pointed out that several of the vinyls have been prepared from glycol and alcohol. Two have been highly satisfactory. "Thus," he points out, "it is possible to make rubber practically entirely from farm products."

Two hundred bushels of grain, he calculated, will yield one ton of the two principal rubber ingredients, or practically one ton of rubber. He declared that a plant could be in commercial production within a year. Even the present plants making butadiene from petroleum could be utilized to process farm products, he said, and there are enough raw materials available now to operate the 100 plants needed to make all the synthetic rubber required.

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New Patents And Inventions

[*Continued from page* 152]

For protecting a wrist watch against the entrance of water, dirt and the like, an inventor has devised a transparent rubber tube of preformed bulging construction which fits over a wrist watch while it is worn. Encircling bands on either side of the tube fit snugly around the wrist and seal the tube against water and dirt.

* * *

Patents Identified
Dog Leash No. 2,250,171
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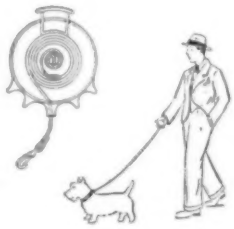
* * *

Taking your dog for a stroll may give you some of the thrill of flying a kite if you use a newly patented adjustable dog leash. The leash is fastened to a spring reel mounted in a small case which fits in a partly closed hand. At one part of the case the leash runs out through a hollow nipple, and opposite the nipple a control brake handle rests against the base of the thumb. With such an arrangement the device fits within the hand in the natural position for casual carrying at ease, or for gripping to check or hold the dog. Complete control of the leash in running out, taking in, and holding it at a selected length, is possible. As the dog runs the leash will be paid out. By applying the brake, the dog is checked. The leash may be drawn in by releasing the brake pressure, whereupon the reel spring winds up the leash.



Garden Stove From Boiler

[*Continued from page* 139]

end of the pipe will enable you to fasten the pipe in solid position with two or three pins running through the collar into holes in the dome.

Now, with the smoke stack to the rear, saw out a suitable door about the shape and proportionate size suggested. Take care to make as clean a cut as possible so this piece of the boiler can be fitted with hinges and a catch and fastened in place in the opening just made, to form a swinging fire-door. While it will not be a tight fit it will be suitable for this purpose.

Draw a line around the boiler about 12" below the door opening and drill several holes at equal distances apart along the line. Fasten 2" bolts into these holes so they will project their length inside. These form a support for the grate, a circular piece of *heavy* 1" wire screen mesh as indicated.

As near as possible to the boiler bottom, cut a second small door to act as a draft and ash door. Fit this with hinges and a catch as you did the fire-door.

Build up a couple of courses of old brick for a foundation, place the boiler on it and then build a third course of bricks around the boiler and cement in all remaining openings, smoothing it off level. By removing the grate, the entire bottom of the boiler can be filled with rubbish to be burned. Replace the grate and you can build a coal or charcoal fire, regulating the intensity by the draft regulation from the bottom door. Accumulating ashes can also be easily removed from the bottom.—*L. B. R.*

"Woodware" For Cottages

[*Continued from page* 131]

with a natural finish the hardware may simply be given a coat of linseed oil as a protection against cracking and warping in damp weather. Articles stained and then waxed or varnished are very appropriate for rustic cabins.

For assembling or mounting, metal screws or wooden pegs may be used. When wooden pegs are used for mounting purposes, they are inserted in holes through the hardware and part way through the door or window. The pegs may be anchored either with glue or with nails.

The hinges consist of an anchor block fastened to the wall, a long horizontal piece which runs the full width of the door or window, and a ½" dowel which serves as the hinge pin. The dowel is inserted through the long horizontal bar and part way into the anchor block.

The drawings are virtually self-explanatory and show clearly the purpose and operation of the various pieces.—*Richard Evans.*

An analysis of automobile requirements shows that 245 parts now made of metal apparently could be made equally well from molded plastics.

Prescription Baseball Bats

[*Continued from page* 73]

still operates in Syracuse, N. Y., one of the country's handful of small factories which produce the bats Americans use for sand-lot, school, and professional baseball. Each season he gets urgent orders for copies of bats broken by big-leaguers. Like a pharmacist refilling a prescription left by a patient or doctor, the bat-maker follows the player's data in turning out one bat, or several, varying not a fraction of an inch or ounce from those the batter used successfully months or years before. Getting such accurate results is a job for craftsmen like Mr. Kren, who learned his trade as a furniture wood-worker in the old country. Each prescription order must be specially filled, and the bat made by hand. It must be carefully turned down from the original ash blank, accurately weighed, and guided fondly through the process—with motions as unhurried and meaningful as those the player will use in taking his stance at the plate to wallop a homer when the new bat arrives, by air express perhaps. Such care and expense are well justified to the team and the players concerned, of course, since a change in weight and balance of the bat might throw the batter off his stride, with disastrous results to his average.

Whether to fill an urgent request by a famous player, or to be picked out from a stack of other bats on a store rack by some eager urchin, each bat has its beginning in the forests of northeastern United States. There grow the Northern Ash trees which are the only type used. Grain of the Northern Ash trees picked must be straight and true, the trunks at least a foot in diameter. Above all, the trees must be nearly a century old.

Not all of one of these trees can be used, either —only that part of the trunk from just above the ground to the first branch. This trunk section is cut into 40-inch lengths, and each length stood on end and divided into three-inch triangular strips called billets. Then the edges are trimmed before shipping to the manufacturer so that each is roughly cylindrical.

Bat-makers receive their supplies of billets in the fall, and stack them in a curing shed to season. A year later, they are brought into the factory to be weighed and measured, then put away for a second year. These two years of curing remove the moisture and prevent later warping and imperfections. Usually a bat blank will lose about eight ounces in weight this way!

The actual manufacturing process begins with the selection of a pattern from the hundreds of possible models, and then billets are chosen according to size and weight. A finished bat may range in length from 33 to 36 inches and in weight from 32 to 38 ounces. The most popular size is the 35 inch, 35 ounce bat. Before the billet can be turned on the lathe, small overlapping knives are set according to the pattern.

[*Continued on page* 178]

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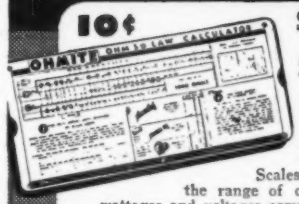

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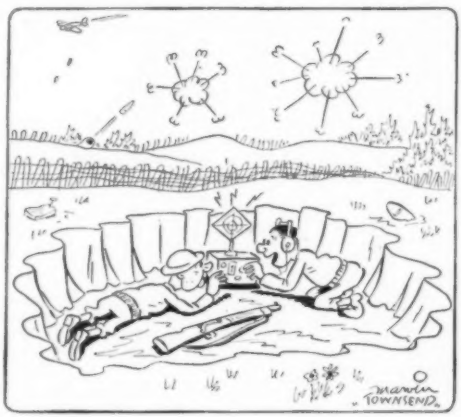
Prescription Baseball Bats

[*Continued from page 177*]

From these the wood passes to a sanding machine in which it is smoothed in just one slow revolution against tiny squares of sandpaper that thrust rapidly against the wood. A tube sucks away dust.

In the next room, bats which are to be dark receive a stain, and all are rubbed with a paste-like filler. When the filler has dried, closing the pores of the wood, a finish of lacquer or shellac is applied. As soon as this coat is dry, the bat is machine-polished to a satin smoothness. Final step is branding the factory's trademark and sometimes the autograph of a famous player on a particular model.

That's the routine followed in principle in all of the bat factories, first of which was established in the United States about 50 years ago as baseball began its march to its present popularity. These plants, although labor-saving machinery has been adopted, are among the last strongholds of craftsmanship standards. One hundred thousand bats are the annual production of the Kren plant; now it's fourth largest in the country and its standards procedures are typical. Mr. Kren himself supervises the important steps in manufacture and concerns himself particularly, of course, with the "prescription bats" when orders for them come in over the names of internationally-known baseball figures. That he'd one day be checking fraction-ounce weights of bats for top-money players of the great American game was farthest from his mind one day a half century ago, shortly after he'd come from Germany and was working in a furniture factory near Syracuse.



"Someone keeps asking if I'm suffering from stomach acidity!"

During his lunch hour he often watched neighborhood boys playing baseball with sticks to strike the ball. One noon he ate hurriedly and returned to his lathe, began experiments in turning out different bats until finally he made one which satisfied him. The next day he asked one of the boys who never could seem to hit the ball, if he didn't want to try a real bat. The lad made an over-the-fence hit—and soon Mr. Kren was making bats for all the boys! Soon he had so many requests that he left the factory to establish one of his own, devoted to the making of baseball bats.

Today the players whose prescriptions are on file with him include Babe Ruth, Joe (Flash) Gordon, Eddie Miller, Nick Ettan, Jimmie Foxx, Bruce Campbell, Roy Johnson, Crash Davis, Rip Collins, Mel Ott, Hal Wagner, and Charlie Keller. Preferences among them vary widely. The Foxx uses a 35-inch bat weighing about 34 ounces during spring training, and later switches to a 33-ounce bat. Most of the professional players use a heavy bat during training and early season, according to Mr. Kren; tiring as the season advances, they change to lighter bats.

Dick Porter, formerly a big-leaguer, uses a bat with a very small knob because he holds the knob in the palm of his hand when he bats, instead of gripping the bat above the knob as most players do.

Joltin' Joe DiMaggio, whose 1941 feat of hitting safely in 56 straight games set a new all-time high and earned him Player-of-the-Year designation for the second time, uses a large, heavy bat—while Hank Greenberg, another consistent clouter, habitually used a thinner bat. Several years ago Mr. Kren made Heinie Groh's well-known "bottle bat." As most players know, in swinging this type of bat Groh and others do not stand at right angles to the pitcher and swing from the side but face the pitcher and hit downward at the ball.

General preferences in bats have changed with the years, too. Twenty-five years ago bats were short (33 or 34 inches long) and fat (38 to 48 ounces in weight). Since then they've been streamlined to 34-36 inch lengths with from 34 to 36 ounces of weight distributed into a thin handle and heavier head with a larger surface area to hit the ball. Science plays a part in this progressive redesigning of even ordinary bats, because a principle of physics has been applied: the pendulum theory. Greater speed and force may be developed on the end with the greater weight.

Scientific laws or not, chief aim of bat and batter today as 50 years ago is to lay a clean one deep into left field. Right?

The British War Office in peace time receives 1,000 to 4,000 suggestions for inventions a year; in 1940, it received 34,540.